

SOUTHERN POWER AND INDUSTRY

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FEBRUARY, 1954

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ALLIS-CHALMERS MOTORS

All These Features of Good Motor Design

CAST IRON END SHIELDS—

assure distortion-free bearing support for maximum bearing life, correct rotor alignment, uniform air gap.

BRAZED CAGE WINDING

— copper or copper alloy cage bars are brazed to end ring to produce a practically indestructible rotor winding.

STATOR COILS—multiple-dipped, baked after each dip. Build up tough protection against heat, moisture and corrosive atmosphere.

ROOMY CONDUIT BOX —

has ample room for easy connection of leads, may be rotated in 90 degree steps.

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— large intake and discharge openings with ample-sized fan assure a sweeping flow of cooling air. Careful baffling of air flow and plenty of space back of stator core assure adequate, even cooling.

3

Extra Values

1

Nation-Wide Certified Service — Allis-Chalmers Certified Service Shops located throughout the country provide factory-approved parts and service on your Allis-Chalmers motors. A-C Certified Service Shops are independently owned shops that meet the strict A-C standards for modern equipment, experience, and business integrity. They provide you with prompt, economical repair and maintenance.

2

Complete Drive From One Source

Allis-Chalmers can supply your complete drive — control — motor — Texrope V-belt drive — from one convenient source.

3

Competent Engineering Help

Your local Allis-Chalmers District Office representative or Authorized Distributor will be glad to help you select exactly the right motor for your needs. For additional information, write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B6052.

A 4227

Texrope and Vari Pitch are Allis-Chalmers trademarks.

Sold . . .

Applied . . .

Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.



CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.



PUMPS — Integral types from 1/2 in. to 72 in. discharge and up.

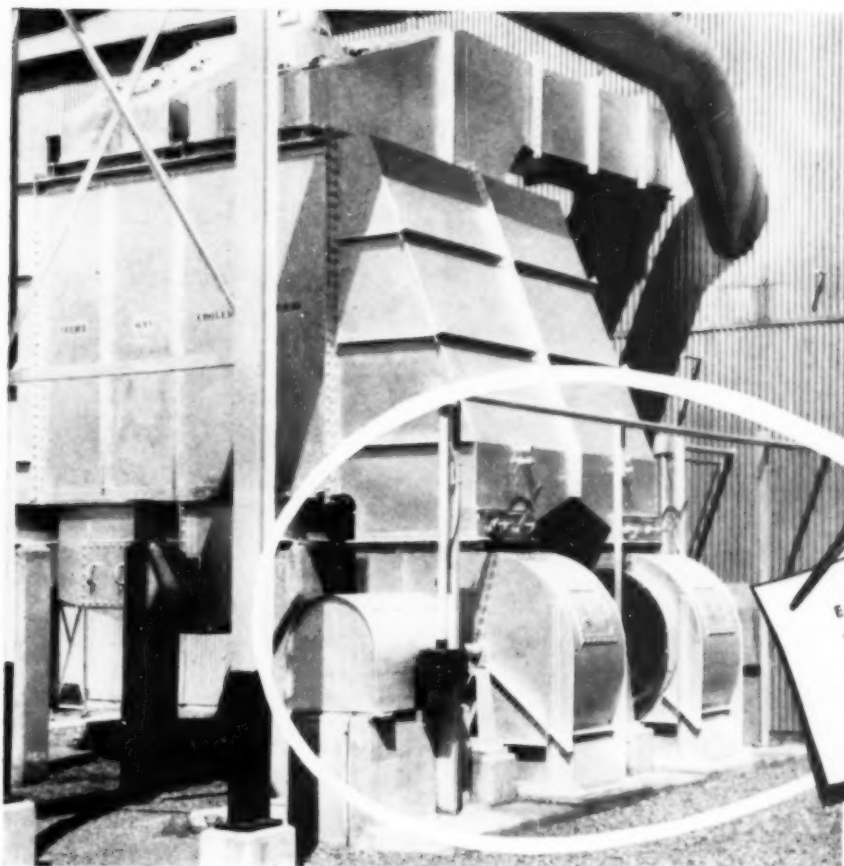
ALLIS-CHALMERS



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Volume 72

Number 2



EACH FAN delivers 34,000 c.f.m. against 9.5 inches static pressure at 4800 feet elevation. Each fan is equipped with Clorage Vortex Air Capacity Control—an exceptionally economical installation.

Where Fan **PERFORMANCE** is Important

AS IN THIS FORCED DRAFT INSTALLATION

the Wise Choice is **CLARAGE**

VALUABLE DATA: The secrets of Clorage superiority are fully explained in this Service Manual—78 pages on your **BEST BUY** in air handling equipment. Write for copy today.



Another Clorage installation out-of-doors! The two Type W Fans shown above furnish forced draft to boilers in the field processing plant of the Stanolind Oil and Gas Company, Powell, Wyoming.

Through winter's cold and summer's heat, these fans must give round-the-clock, uninterrupted service.

Unprotected fan equipment to function properly must be good! From past experience over many years, the consulting engineers and the boiler people KNEW that they could recommend Clorage without reservation.

Yes, regardless of operating conditions—indoors or out—you can **RELY** on Clorage Fans to provide economical service for a long time to come.

You can Rely on...

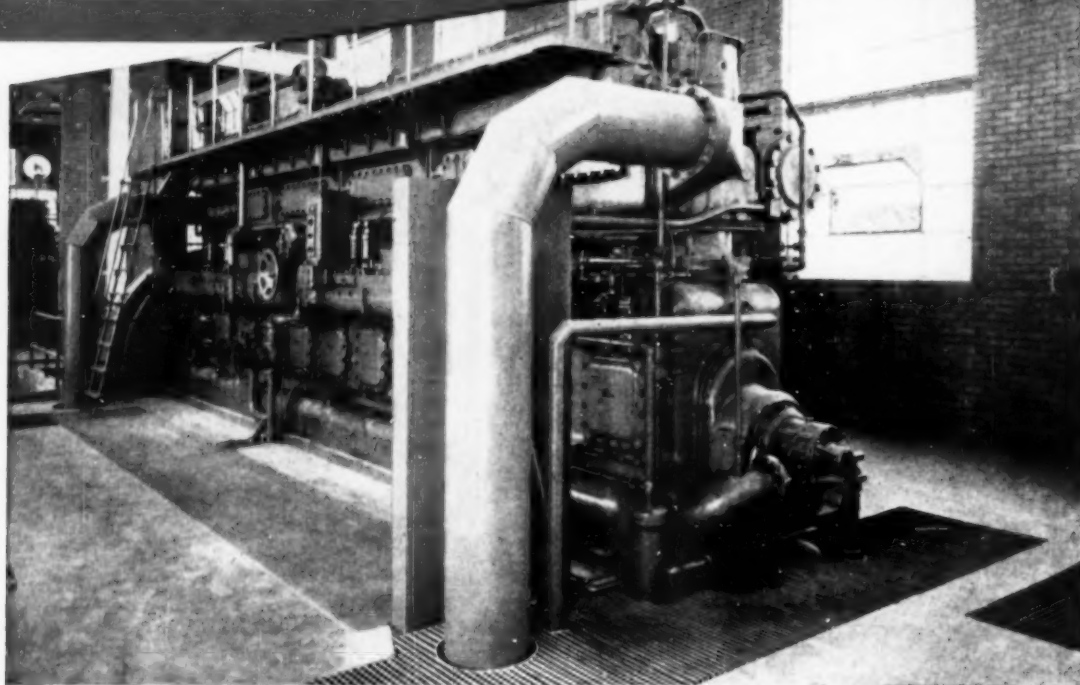
CLARAGE



Headquarters for
Air Handling and
Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

TYPICAL EXAMPLES OF LOW COST DIESEL ENGINE OPERATION



...with TEXACO URSA OILS

In plants everywhere, Diesels lubricated with the recommended member of the famous *Texaco Ursa Oil* series are turning in outstanding records for low maintenance costs and economical fuel consumption. For example, (names on request) —

Tulia, Texas: Has been using *Texaco* for 20 years, never had a stuck ring. Wear has been slight, maintenance costs very low.

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The *Texaco Ursa Oil* series is a complete line of Diesel lubricating oils especially refined to make Diesel, gas and dual-fuel engines give *more power with less fuel* over longer periods between overhauls. That is why —

For more than twenty years, more stationary Diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

Let a *Texaco* Lubrication Engineer help you. Just call the nearest of the more than 2,000 *Texaco* Distributing Plants in the 48 States, or write:

The *Texaco* Company, 135 East 42nd Street, New York 17, N. Y.



TEXACO URSA OILS

FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

TUNE IN . . . METROPOLITAN OPERA radio broadcasts every Saturday afternoon. See newspaper for time and station.

SOUTHERN POWER AND INDUSTRY

Vol. 72
No. 2

FEBRUARY
1954

NBP



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Editorial and Executive Offices:

SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E., ATLANTA 5, GEORGIA

Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

February, 1954

- **CONTROLLED CIRCULATION** reduced construction and operating costs for Virginia Electric and Power Company's Unit No. 3 at Chesterfield. Boiler is the first postwar controlled circulation reheat unit to go into operation and is the lowest pressure utility boiler with controlled circulation to date. Recent performance report indicates dependable capacity and freedom from operating difficulties.

Features include positive, controlled circulation in exact proportion to calculated heat distribution, steady water level on quick load swings, quick response to load demands, quick access to furnace and short outages for repairs, due to rapid cooling, and no hideout of solids in boiler water.

These and other design, operating and maintenance features (furnace-wall and boiler heating surface design, external circulating system, boiler drum, structural, operating economy, and flexibility of operation) are discussed in this issue of SP&I.

- **UTILITY FIRE PROTECTION** development's (high velocity water fog and chlorobromomethane) will result in a reappraisal of present techniques. A good fire protective system in a modern station is expensive and is effective only if fully trained personnel understands its use.

Recent tests at the River Junction plant of the Gulf Power Company indicate that the operation of large overhead fog tips will control a fire on the top and sides of a transformer, regardless of its size. Such a system is preferable, from cost and operational standpoints, to a large number of fixed fog heads surrounding the transformer.

Modern fog systems will form an excellent backbone of protection, but first and second line of defense should be portable carbon dioxide and chlorobromomethane units for controlling fire in its incipency as well as fixed carbon dioxide systems for protection of switchgear.

- **MYSTERIOUS JARGON**--Instrument engineers are having themselves a time with a language as baffling to the inexperienced as the jargon of the neuro-surgeon would be to a garage mechanic. Automation . . . closed loop . . . cybernetics . . . digital computer . . . discrete units . . . equilibrium . . . feedback . . . gain . . . thermistors.

See what we mean! Some of them aren't even in the dictionary; and still worse, words that ARE in the dictionary take on an "instrument" meaning that has nothing in common with the dictionary definition.

We're confused too and decided to confer with a few individuals who speak this new language and extract from them the down-to-earth meaning of at least a few of these mysterious terms. Results of these efforts are featured in this issue of SP&I. The question-answer-example tabulation is not complete and some definitions may be hotly criticized by experts, but at least we feel it is a step in the right direction.

(Continued on page 6)

OILTIGHT LIMIT SWITCHES

Here is a new line of remarkably compact Allen-Bradley limit switches . . . streamlined for fine appearance and built for millions of failure-free operations.

The operating heads of these limit switches may be attached to the switch body in four definite locations, each 90 degrees apart. A large selection of pushrods, lever arms, and other actuating mechanisms is available.

The name plate cover has a synthetic rubber gasket to exclude oil. Terminals are easily accessible by removing the cover plate. The body is threaded for $\frac{1}{2}$ " conduit. The switch mechanism is snap-acting with one single pole normally open and one single pole normally closed contact, electrically separated.

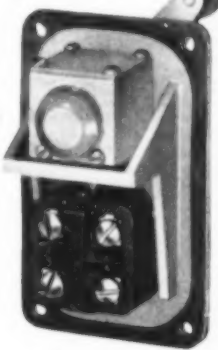
The new Bulletin 802T limit switches are designed for machine tool applications. For further information send for a copy of Allen-Bradley Bulletin 802T.

Allen-Bradley Co.

1328 S. Second St., Milwaukee 4, Wisconsin



Roller lever type
(Front View) for cavity
mounting



Roller lever type (Rear View)
showing terminals for n.o. &
n.c. contacts

Bulletin 802T roller
lever limit switch



Pushrod limit switch
with roller for vertical
motion of the pushrod

Pushrod limit switch
without roller — cover
off to show terminals

Pushrod limit switch
for horizontal motion
of the pushrod

Pushrod limit switch
with side pushrod and
maintained contacts

Lever operated limit
switch with a long and
flexible operating rod

ALLEN-BRADLEY SOLENOID MOTOR CONTROL

CONSULT YOUR LOCAL ALLEN-BRADLEY REPRESENTATIVE

ALBUQUERQUE—A & A Supply Co., P. O. Box 1516, 114 N. Morningside St., Tel. 5-5506
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BALTIMORE—H. M. Wood & Co., 124 Light St., Tel. Mulberry 4643-44
BIRMINGHAM—W. H. Beaven, 300 So. 23rd St., Tel. 7-5479
CHARLESTON—W. J. Hess, Room 302 Morrison Bldg., 815 Quarrier St., Tel. 2-5323
CHARLOTTE—Le Roy P. Spoon, 307 Lincoln St., Tel. 4-6334, 6-4301
DALLAS—J. K. Webb, 1814 Irwin-Kessler Bldg., Tel. Riverside 5061
HOUSTON—Wilson Electrical Equip. Co., 2930 Commerce Ave., Tel. Alwood 1557
JACKSONVILLE—Robert P. Smith Co., 2031 Hendricks Ave., Tel. 9-9474
KANSAS CITY—B. L. McCreary & Son, 1819 Central, Tel. Harrison 1668

KNOXVILLE—Bowditch & Co., 1311-C N. Broadway, P. O. Box 3145, Tel. 4-2513
LITTLE ROCK—Curtis H. Stout & Co., P. O. Box 107, 400 Shall St., Tel. 4-8835
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NEW ORLEANS—Robbins & Robbins, 1037 Magazine St., Tel. Canal 5805
ST. LOUIS—G. W. Scholchlin, 904 No. Grand Blvd., Tel. Lucas 1901-02
SAN ANTONIO—Wilson Elect. Equip. Co., P. O. Box 5121, 101 E. Maple St., Circle 4-1471
SAN DIEGO—James A. Setchell, 301 W. "G" St., Tel. Franklin 3981
TULSA—John W. Elder, 1526 East Fourth St., Tel. 3-9149

facts and trends (continued from page 4)

- **THE ATTITUDES OF THE ENGINEER**--that increasingly necessary individual-- have recently been "blueprinted" in a very worthwhile report on "How to Attract and Hold Engineering Talent." It is the end product of a survey participated in by more than 200 employers of engineers and by 1,400 engineers employed in industry throughout the country.

Opinions of both groups cover **THE RAW MATERIAL** (Are graduates properly prepared? . . . Preparation brings contentment . . . What can industry do?); **RECRUITING TECHNIQUES** (Overselling the college graduate . . . Successful recruiting methods); **GOAL OF THE YOUNG ENGINEER** (What does he want? . . . How to provide what he wants); **BENEFITS AND INCENTIVES** (What makes a good job? . . . Incentives are important); **WHAT ABOUT THE UNIONS?** (Do engineers want a union? . . . Do they want non-bargaining organizations?).

Copies of **HOW TO ATTRACT AND HOLD ENGINEERING TALENT** are available from The Professional Engineers Conference Board for Industry, 1121 Fifteenth St., N.W., Washington 5, D. C., at \$2.00 per copy to non-members and \$1.00 per copy to members of the Society.

- **A SPECIAL LOAD CONTROL SYSTEM** is utilized at Lone Star Steel Company's Texas operation to take care of **UNUSUAL LOAD SWINGS** from the 8,500 hp reversing motor in the strip mill and a 4,000 kw welder. Average 15 min. demand for electrical power is around 23,000 kw, but short time peaks approximate 39,600 kw.

Governor used in the load control system employs a highly sensitive motor which has the ability to open or close all turbine steam valves in less than 4 seconds. Fast acting governor, developed by G.E., materially reduces the effect of load swings in the steel mill and on the outside electrical system.

- **LIMITING HEAT RATE INCREASES**--plant efficiency decreases when plant load factor decreases. Operating as a peaking plant, load factor becomes low, the heat rate increases, and efficiency drops.

Southwestern Gas and Electric engineers in Shreveport, La., recently endeavored to locate the sources of the increased heat rate and reduce the losses as much as possible. Auxiliaries, distilled make-up water, and final steam temperature were the principal contributors.

They recommended that auxiliaries that can be cut off and not affect plant operation should be studied in each plant; packing gland drains and deaerator vents should be examined; and that excess air and burner combinations be checked. It all added up to improved station efficiency at low loads.

- **SCARCITY OF SURFACE WATER** prompted the use of air coolers for condenser service at the Pampa, Texas, plant of Celanese. Result is one of the largest single installations of **AIR COOLED CONDENSERS** in the world.

Plant produces acetic acid, acetic anhydride and their derivatives from light petroleum gases. Twenty-six huge Alco air coolers handle approximately 80% of the plant's total cooling load. Total heat dissipated is 229,400,000 Btu/hr. Air cooler design features stainless steel headers and tubes and aluminum fins.

Air coolers are used primarily as process condensers, with condensing temperatures ranging from about 160 to 250 F. Units are mounted in 17 ft x 24 ft induced-draft housings, each equipped with two Monel fans mounted on silicon rubber.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.



Those MARLEY fans
sure move a lot of air!

...and they will
keep on doing it!

... that's because Marley multi-blade aluminum fans are engineered specially for cooling tower application—specifically, for Marley cooling towers. The true air foil blade design, based on years of research and wind tunnel testing, was selected as the most efficient for the range in air velocities and pressures found in various types of cooling towers. The twist and taper of the wide, sturdy blade is designed to provide constant velocity from hub to tip. By using six to twelve blades, depending upon fan diameter, Marley fans operate more smoothly and quietly.

Another reason Marley fans move a lot of air is that they operate in Marley Laminated Fan Cylinders, developed to complement the performance of this particular fan. Marley fans, air delivery cylinders and Geareducers are engineered as complete functional units, assuring the balance necessary to attain top fan efficiency.

Durability and strength are important, too. These are achieved by utilizing the newest casting techniques and an aluminum alloy selected for its castability, strength and corrosion resistance. Every dimension from shank to tip is more than ample for any operating load encountered.

For further details write for Bulletin No. CF-54 or contact your nearest Marley representative in any of fifty major cities.

The Marley Company

Kansas City, Missouri

SOUTHERN POWER & INDUSTRY for FEBRUARY, 1954

Founder Member
Cooling Tower Institute



NEWS for the South and Southwest

National Radiator—Miss.

ENGINEERING SALES Co., 550 Grandview Circle, JACKSON, MISS., is now representing in that marketing area the heating products of THE NATIONAL RADIATOR COMPANY, Johnstown, Pa. W. V. POTTS is in charge of the Jackson office, which is a branch of Engineering Sales Co., New Orleans.

Gilsonite Names North Brothers—Atlanta

AMERICAN GILSONITE COMPANY, a subsidiary of Standard Oil Company of California, has announced the appointment of NORTH BROTHERS, Boulevard at 8th St., N. E., ATLANTA, GEORGIA, as Georgia distributor for Gilsulate underground insulation for hot pipe lines.

Alvey Conveyor—Carolinas

CURRAN S. EASLEY has been appointed District Manager by the ALVEY CONVEYOR MFG. COMPANY of ST. LOUIS, MISSOURI. His headquarters will be P. O. Box 3123, GREENVILLE, SOUTH CAROLINA.

Mr. Easley is well known in the Carolinas, having been engaged in Engineering Sales and Consulting work in the area for many years.

KSM Products—Southwest

KSM PRODUCTS, INC., Merchantville, N. J. manufacturers of welding studs and stud welding equipment have announced the addition of a new distributor, S&S INDUSTRIES, INC., 4320 Alief Road, HOUSTON, TEXAS, to cover Texas, Arizona, Oklahoma, New

Mexico, and the western part of Louisiana.

HERBERT W. SCOTT, JR., and ROBERT H. SIMON own and pilot a four-passenger airplane for rapid service of accounts throughout their wide territory.

Tampa Armature Expansion

TAMPA ARMATURE WORKS, INC., 401 S. Morgan St., TAMPA, FLORIDA, has a \$50,000 expansion program under way to provide an additional 6100 sq ft of working space for electrical and repair facilities.

The company, which was founded in 1921, has 130 employees in the Tampa plant and 45 in its Jacksonville Branch. J. ARTHUR TURNER is president.

FUTURE EVENTS Of Engineering Interest

NATIONAL ASSOCIATION OF PURCHASING AGENTS, W. H. Jones, Chm., Public Utility Buyers' Group, Philadelphia Electric Co., Philadelphia 5, Pa.
Feb. 15-16, Mid-Winter Conference, Public Utility Buyers' Group, Lord Baltimore Hotel, Baltimore, Md.

MANAGEMENT TRAINING CONFERENCE, John M. Avent, Conference Director, 729 Techwood Dr., N.W., Atlanta, Ga.
Feb. 23-26, Sixth Management Training Conference (Method Simplification, Time-study and Cost Control), Henry Grady Hotel, Atlanta, Ga.

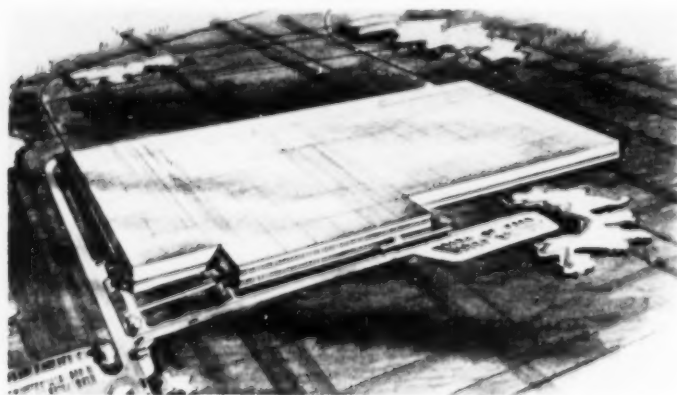
SOUTHERN SAFETY CONFERENCE AND EXPOSITION, W. L. Groth, Exec. Dir., P.O. Box 8927, Richmond 25, Va.
March 7-9, Fifteenth Annual Conference and Exposition, Kentucky Hotel, Louisville, Ky.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, A. B. Campbell, Exec. Sec'y, 1961 M&M Bldg., Houston 2, Texas.
March 15-19, Tenth Annual Conference and Exhibition, and Refinery Industry Symposium, Kansas City, Mo.

SOUTHERN INDUSTRIAL WASTE CONFERENCE, Sponsored by Manufacturing Chemists Association, Maurice F. Crass, Jr., Sec'y., Woodward Bldg., Washington 5, D. C.; Southern Association of Science & Industry; and Texas Chemical Council.
April 21-23, Conference, Hotel Shamrock, Houston, Texas.

BASIC MATERIALS EXPOSITION, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
May 17-20, Basic Materials Exposition and Conference, International Amphitheatre, Chicago, Ill.

THE SOCIETY OF THE PLASTICS INDUSTRY, INC., Wm. T. Crass, Exec. V.P., 295 Madison Ave., New York 17, N. Y.
June 6-11, Sixth National Plastics Exposition, Cleveland Auditorium, Cleveland, Ohio.



Westinghouse Electric's Air Conditioning Plant at Staunton, Virginia, Now Under Construction

THE WESTINGHOUSE ELECTRIC CORPORATION broke ground late in '53 for a new air conditioning plant at STAUNTON, VIRGINIA.

Harry E. Seim, Westinghouse Vice President and general manager of the Air Conditioning and Sturtevant Divisions, pointed to the project as tangible evidence of Westinghouse faith in the future growth of the air conditioning industry.

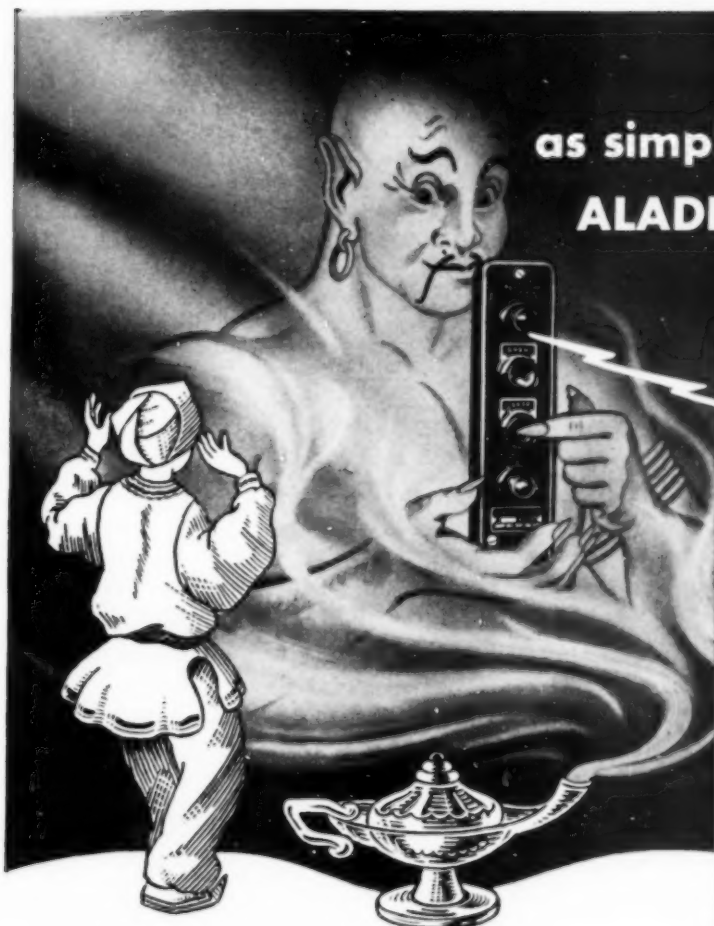
"This plant will increase our productive capacity for packaged air conditioners five-fold," Mr. Seim said, "and will enable us to keep pace with

the growing demand for residential, commercial, and industrial air conditioning equipment."

Capacities of these packaged-type units will range from 2-tons of cooling effect to 15-tons. The recently announced Westinghouse air-to-air heat pump will also be produced here.

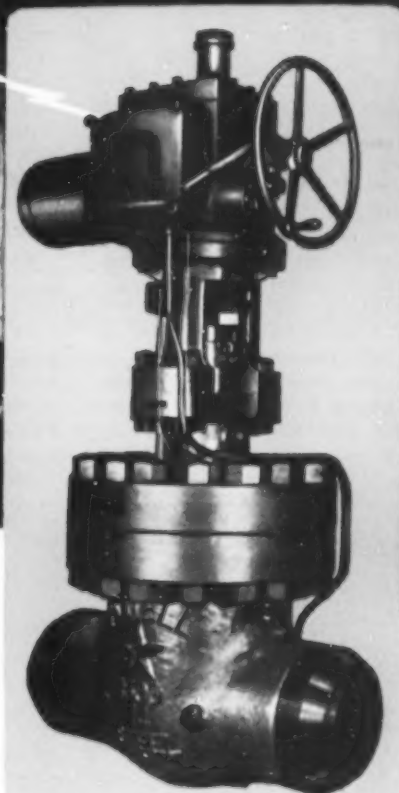
The new plant at Staunton, Virginia, will be modern in every respect.

The general contractor is the Turner Construction Company of New York. The architects and engineers are Robert & Company Associates of Atlanta, Georgia.



as simple as rubbing
ALADDIN'S MAGIC LAMP

LIMITORQUE
MOTORIZED VALVE OPERATION



"just the push of a button"

Hardly less magical than the rubbing of a lamp, accompanied by a few mysterious incantations—is the opening and closing of huge valves under high pressures, in remote places, or even miles away—by the MERE PUSH OF A BUTTON. Yet, that is the magic of *Limitorque* Valve Operation—safe, sure, dependable, accurate—and without the possibility of any damage to valve stem, seat, or disc.

Limitorque, is truly Valve Operation Magic—and that is why far more *Limitorque* Valve Operators are used today, than all others combined. Be convinced, send for our latest literature.

SERVING SOUTHERN INDUSTRY from LYNCHBURG, VA.

For catalogs or detailed information, write Virginia Gear and Machine Corp., Lynchburg, Va., or the address below.

Philadelphia Gear Works, INC.



ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
Limitorque Valve Controls

news for the South and Southwest (continued)

Trane—Oklahoma City

THE TRANE COMPANY, La Crosse, Wis., manufacturer of air conditioning, heating and ventilating equipment, announces the new location of the OKLAHOMA CITY, OKLA. sales office at 819 North Virginia Street.

E. M. JAMESON is sales engineer in charge of the office.

Nordberg Mfg. Co.—Fla.

Appointment of J. FRANK KNORR INCORPORATED, 528 N. W. 7th Ave., Miami, Florida, and their affiliate J. Frank Knorr, 911 E. Platt St., Tampa, as distributor in Southern and Central Florida is announced by the NORDBERG MANUFACTURING COMPANY, Milwaukee 1, Wisconsin.

Active management in Miami is under the direction of ARTHUR C. KNORR, now president of that corporation. FRANK KNORR, JR. is president and general manager at Tampa.



Dixie Guano Expands North Carolina Plant

Aerial view of DIXIE GUANO COMPANY'S fertilizer-manufacturing plant at LAURINBURG, N. C. shows, at right, recently completed 39,000 sq ft addition designed and fabricated by Luria Engineering Company.

A feature of the addition is fully-automatic equipment which will enable a single man during seasonal lulls to fill entire bulk storage area with 12,000 tons of bulk mixed fertilizer, thus providing substantial inventory ready for processing and packaging in peak Spring-planting period.

New standardized steel-frame

Mine Safety Appliances—S. W.

Appointment of WILLIAM H. GATES as manager of the Southwest District of MINE SAFETY APPLIANCES COMPANY, has just been announced.

Mr. Gates, who joined the company in 1938, had been assistant manager of the district for the past year. He succeeds Harry W. Richards, Tulsa, who died recently.

Headquarters and warehouse of MSA's Southwest District are at 1015 S. Cincinnati Ave., Tulsa. The district includes Oklahoma, Texas, Louisiana, Mississippi, and Arkansas.

Clark Equipment—Tex., Md.

Four new dealers have been appointed by the Construction Machinery Division of CLARK EQUIPMENT COMPANY to handle the earth-moving equipment formerly manufactured by the Michigan Power Shovel Company, which was recently acquired by Clark Equipment. Appointments include

BERRY BROTHERS MACHINERY COMPANY, DALLAS, TEXAS, and HENRY H. MEYER COMPANY, INC., BALTIMORE, MD.

Reynolds Metals—Louisville

ARVO AHO, formerly Merchandising Manager of the Dayton Rubber Company, has been named Sales Promotion Manager, Building Products Division, REYNOLDS METALS COMPANY, LOUISVILLE, KENTUCKY.

Darling Valve—Tulsa, Okla.

DARLING VALVE & MANUFACTURING COMPANY, Williamsport, Pa., announces the appointment of JOSEPH T. COWAN as District Representative in the TULSA, OKLAHOMA territory.

Simplex—South, Southwest

SIMPLEX VALVE AND METER COMPANY, 68th and Upland Streets, Philadelphia 42, Pa., announces the appointment of E. M. LOGAN as service engineer for FLORIDA, MISSISSIPPI, and parts of GEORGIA, ALABAMA, and LOUISIANA. Mr. Logan's headquarters are at Woodland Park Apartments, 20th Ave. North, St. Petersburg, Fla.

J. L. RAINIER, 1536 N. E. 39th St., Oklahoma City, Okla., is the new service engineer covering OKLAHOMA, TEXAS, and other Southwestern states.

Management Training Conf. Atlanta, Ga., Feb. 23-26

Four days of intensive training in method simplification, timetudy and cost control is again offered by John M. Avent and Phil Carroll with the announcement of the 6TH MANAGEMENT TRAINING CONFERENCE at the Henry Grady Hotel, ATLANTA, GEORGIA, February 23-26th.

On February 23 and 24, JOHN AVENT, registered professional engineer and president of John M. Avent & Associates, Inc., consulting management engineers of Atlanta, Ga., will show how a method simplification program can be installed in any plant.

On February 25 and 26, PHIL CARROLL, registered professional engineer and consultant of Maplewood, N. J., will discuss preparing for wage incentives, and the use of labor standards in cost controls, production control and incentives.

For registration blanks and additional information, write JOHN M. AVENT, conference director, 729 Techwood Dr., N.W., Atlanta, Ga.

(More news on page 136)

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?

A. UNITED STATES RUBBER COMPANY.

Q. What ONE wire and cable producer makes plastics?

A. "U. S."

Q. What is the most important part of wire and cable?

A. The insulation.

Q. Who is best equipped to make wire and cable with superior insulation?

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.



Tapping rubber from one of the millions of trees on U. S. Rubber's giant plantations in Malaya.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

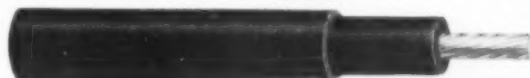
UTILITIES: Power Cables • Street Lighting • Royal Cords • Network Cables • Utility Control • Pole & Bracket Cable • Service Entrance • Weatherproof • Zip Cord Pole Fixture Cable • Sup. Control

RAILROADS: Power Cables • Communications • Railway Signal • Royal Cords • Welding Cable • Railway Utility • Sup. Control • Weatherproof

HEAVY INDUSTRY: Power Cable • Royal Cords • Welding Cables • Control Cables • Machine Tool Wire • Building Wire • Switchboard Wire • Thermostat Cable • Bus Drop Cable



OZONE Absolute Tops in MOISTURE Resistance HEAT



U. S. RUBBER'S BUTYL-INSULATED POWER CABLES

These cables are for use on power distribution, street lighting and station control circuits and for general purpose wiring on circuits up to 8000 volts between phases and at conductor temperatures up to 80 C. The insulation will not crack after four hours in air containing 0.015 per cent ozone. They are light in weight, easy to install and join, and are resistant to oil, heat, sunlight, flame, acids, alkalis and corrosive chemicals. The following are guaranteed test values:

PHYSICAL AND AGING PROPERTIES (MINIMUM VALUES)

	Butyl Insulation		Neoprene Jacket	
	After 168 Hrs. in O.B.	After 7 days in Air Oven at 250 F.	After 96 Hrs. in O.B.	
Tensile, lbs. per sq. in.	600	500	1800	1600
Elongation, per cent	400	350	300	250

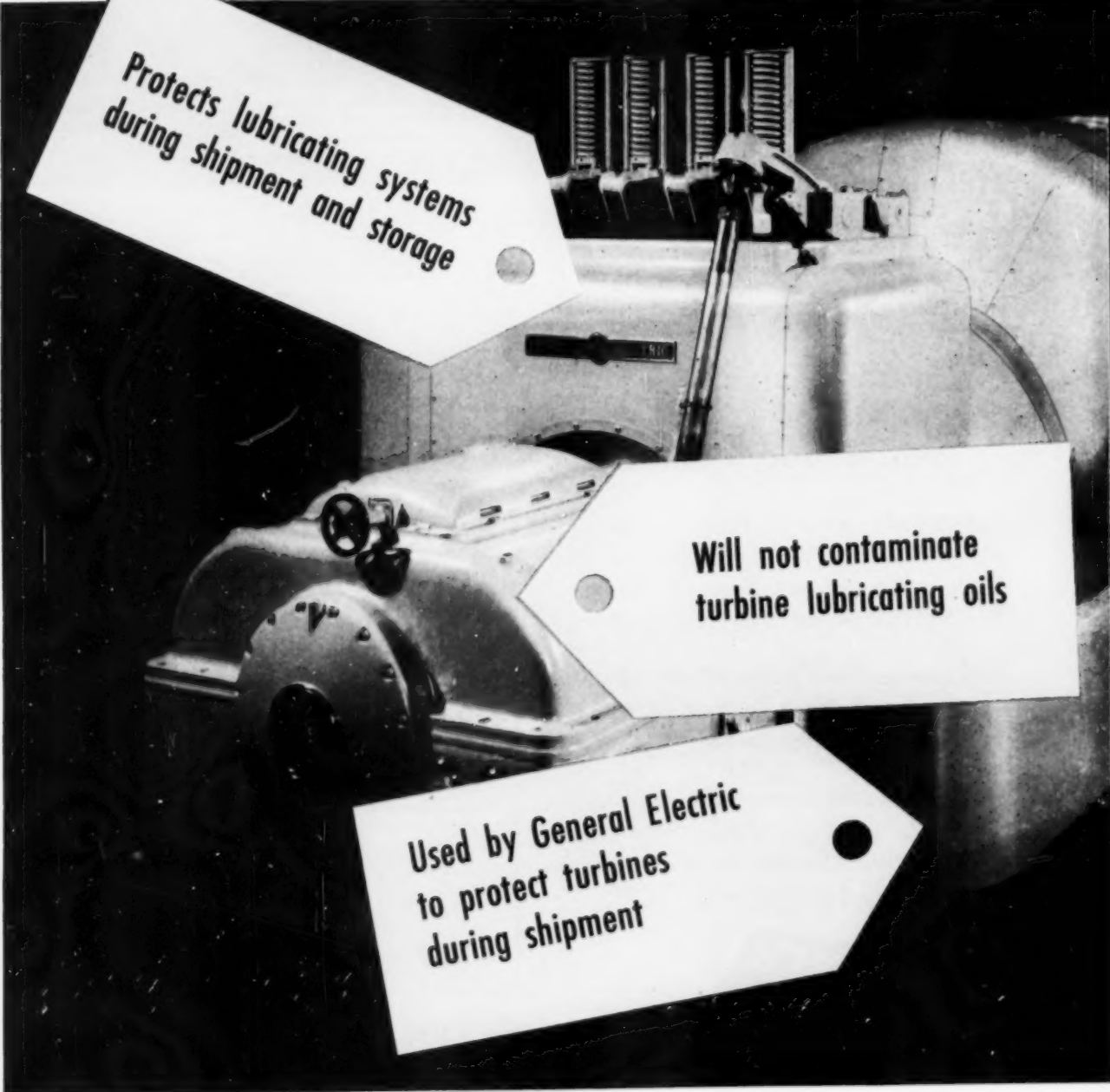
MOISTURE RESISTANCE (MAXIMUM VALUES)

a. Dielectric constant and power factor of insulation after immersion in water at 50 C.		
Dielectric constant, one day	4.0	
Per cent gain, 1 to 14 days	2.0	
Per cent gain, 7 to 14 days	1.0	
Power factor, one day, per cent	2.0	
b. Mgs. per sq. in., 7 days at 70 C.		15.0

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE & CABLE DEPT. • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

announcing **GULF OILCOAT T**



Protects lubricating systems
during shipment and storage

Will not contaminate
turbine lubricating oils

Used by General Electric
to protect turbines
during shipment

the ideal turbine rust preventive

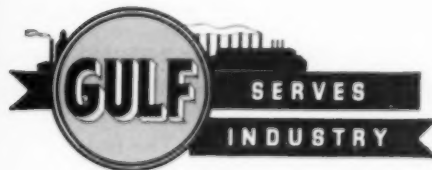
Now—an effective turbine rust preventive that is non-oil contaminating!

Gulf Oilcoat T—the latest development of Gulf Research Laboratories—in addition to protecting turbine lubricating systems from rust during shipment and storage, will not contaminate turbine lubricating oils. This compatibility with lubricating oils is of paramount importance if your turbine system is flushed with the same oil that is to be used for lubrication.

General Electric Company, after comprehensive testing, has established Gulf Oilcoat T as an effective rust preventive and is using it in G-E turbines.

Because of its light viscosity this new product may be sprayed on metal surfaces, or it may be applied by dipping or brushing.

Although developed primarily for protecting turbine lubricating systems, Gulf Oilcoat T also prevents corrosion on other types of machinery during extended shutdowns.



**Gulf Oil Corporation
Gulf Refining Company**
1822 Gulf Building
Pittsburgh 30, Pa.

support
Junior
Achievement





CHIEF ENGINEER WILLIAM NOTE inspects the original Leslie Temperature Pilot taken from heater for its first overhaul. Leslie Representatives **Frank Riggio** (left) and **Bob Gentner** (right) look on.



DEWITT O. HESSLER, Laundry's President, joins Chief Note in examination of the original Leslie Pilot before reinstallation.

HOW SHOULD A 21-YEAR-OLD BEHAVE?

Temperature Pilot leads flawless life for 21 years prior to its recent, initial overhaul

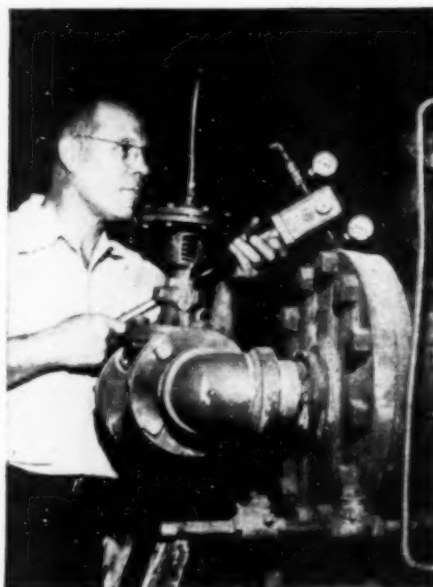
A 21-year-old Leslie Temperature Control Pilot had its "coming-out-party" recently at the Hessler Laundry, Paterson, N. J. The very first one of its kind ever made, it was installed at the Hessler plant back in 1933 by the firm's chief engineer, Bill Note—who also ordered the pilot's first overhaul in 21 years of continuous service.

The pilot was designed to control constant process temperature over extended periods without necessity for recalibration or replacement of thermal elements. The Hessler field test worked out so well that the pilot was left untouched after its initial setting, for 21 years.

Periodic inspections showed the pilot was doing the job without appreciable wear or need for any attention. This year, it was removed from the heater for a complete examination and after a quick clean-up, it was put right back into service.

Top performance suggests other applications

The outstanding behavior of this first pilot is being repeated today by Leslie Pilots in hundreds of other applications in all industries. The wide adjustable ranges (32°-400°F and 300°-600°F) make the pilots adaptable to most operating conditions. The fast-responding bi-metallic element responds to changes as small as 1/4°F.



CHIEF NOTE REINSTALLS PILOT after no-cost overhaul. Parts showed no appreciable wear or corrosion after 21 years of continuous hot water heater service.

Send for Technical Data Sheet 464-14 describing Leslie Temperature Pilots and Controllers.



**TOPS IN QUALITY PRESSURE
LEVEL AND TEMPERATURE CONTROLS**
Since 1900

2016

LESLIE CO. 261 Grant Avenue, Lyndhurst, New Jersey



new **WIDER VISION**

for easier remote boiler
water level readings

■ Vastly improved visibility of remote boiler water level readings can now be enjoyed by boiler plant operators.

A new "wide vision" face on Yarway Remote Liquid Level Indicators allows reading from the side as well as front of the indicator. Boiler water levels and other liquid levels can be checked from most any position.

Indicating mechanism is operated by the boiler water level itself—assuring instant, accurate readings.

Yarway Indicators are of the manometric type with automatic temperature compensation, as approved for use under the recent A.S.M.E. Boiler Code Committee ruling in Case # 1155.

Over 10,000 are used throughout industry for boiler water and other liquid level indication... and for superheater pressure differential indication aboard ship.

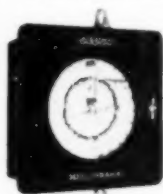
For full information write for Bulletin WG-1823.

YARNALL-WARING COMPANY

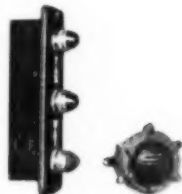
Home Office: 116 Mermaid Ave., Philadelphia 18, Pa.
Southern Representative
ROGER A. MARTIN, Bona Allen Building, Atlanta 3, Ga.

A COMPLETE YARWAY SYSTEM

Besides Remote Liquid Level Indicators, Yarway also offers Liquid Level Recorders and Remote Signal Alarms... making a complete system for constant, accurate liquid level check.



■ Yarway Hi-Lo-Graph Recorder provides not only water level indication, but also a 24-hour recording of water levels. See Yarway Bulletin WG-1830.



■ Yarway Remote Hi-Lo Alarm Signals—lights or horns—can be placed at any location in plant. See Yarway Bulletin WG-1823.

YARWAY

**remote liquid
level indicators**

WHERE TO GET IT And How to Do It



—INDEX OF HELPFUL BOOKLETS, BULLETINS, REFERENCE LITERATURE—

Cooperating with leading manufacturers of equipment and supplies, SPI makes available for the asking without cost or obligation, the following valuable bulletins, booklets, handbooks and catalogs.

Check the list, fill in Coupon, mail to SOUTHERN POWER & INDUSTRY. (Coupon Post Cards on pages 17 and 18.) This service restricted to those interested in the operation or design of Industrial, Power and Service Plants.

STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

4 OIL AND GAS BURNERS—Bulletin OH-27, 16 pages—Illustrates a variety of oil and gas burners, liquid fuel pump and heating equipment, in various sizes to handle all types of fuel oil, tars and gases.—THE ENGINEER CO.

7 STEAM GENERATORS—Catalog 1218—Describes packaged units 15 to 500 hp. Gives construction details of models for single or multiple fuel firing.—CHIC & SEMBOWER, INC.

9 PACKAGE UNIT BOILERS—Bulletin fully describes 10 to 250 hp steam generating units built to order, mounted on skids for portable or permanent installation. Construction and assembly make boilers easy to install, ready promptly for water, gas, steam and electrical connections, ASME code construction.—PEERLESS BOILER & ENGINEERING CO.

15 PACKAGE BOILERS—Bulletin about complete line of water tube package boilers for process and heating service. Twelve sizes from 6,000 to 39,000 lb/hr. Pressures to 900 psig. Automatic. Gas or oil. Portable—indoor or outdoor installation.—SPRINGFIELD BOILER CO.

25 DOUBLE-PASS BOILERS—Bulletin 153—Gives complete specifications of a new double pass all-purpose industrial and heating boiler. Sizes from 44 to 153 hp S.R.I. with pressure up to 150 lb. designed for coal, gas or oil firing. This is a complete package double-pass unit, recently added to a regular line of single-pass firebox boilers manufactured since 1918.—LUCKY BOILER & MANUFACTURING CORP.

29 CONTINUOUS BLOW-OFF—Bulletin, 8 pages—Gives the basic facts about boiler blow-off, and describes the Madden system of control of continuous blow-off for the removal of solids and impurities from steam releasing surfaces.—THE MADDEN CORPORATION.

35 UNIT STEAM BOILERS—Catalog AD-100—Gives complete information on oil and gas fired "Self Contained" boilers, 15 to 500 hp, 15 to 250 psi for processing and for heating. Gives features, applications, efficiencies, capacities and dimensions.—CLEAVER-BROOKS CO.

38 STEAM GENERATORS—Bulletin SP-2—with photographs, cut-aways and typical boiler room layouts—describes Armstrong generators for oil or gas firing, from 10 to 600 hp, 15 to 200 lb steam pressure.—AMES IRON WORKS, INC.

55 HIGH-DUTY FIREBRICK—Bulletin 103—Describes a complete line of high-duty dry-pressed firebrick for all sorts of furnaces—boiler, forge, gas plant, glass, open hearth, billet, soaking—for ceramic kilns, smoke stacks, incinerators, and the like—prompt shipment in convenient form.—THE IRONTON FIREBRICK CO.

68 OIL BURNERS FOR LIGHT OR HEAVY OIL—Bulletin 65—Describes National Atroll Type "LAP" oil burners to operate with light or heavy oil under manual or automatic control, using low air pressure for atomization. Wide firing range in each of seven sizes.—NATIONAL ATROLL BURNER COMPANY, INC.

79 TWO-DRUM BOILERS—BC Bulletin, 16 pages—Describes and illustrates two-drum boilers of the integral fur-

nace type, with information and dimension data on two designs available in a variety of sizes for oil, gas and stoker firing. Typical installations shown and described.—ERIE CITY IRON WORKS.

83 STEAM GENERATORS & BOILERS—Bulletin P-1, 6 pages, describes oil, gas or combination boilers for processing and heating plants. Sizes 18 to 500 hp—15 to 200 psi. Complete installation and performance information. CYCLOTHERM DIVISION, UNITED STATES RADIATOR CORP.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

106 BLOWERS AND FANS—Bulletin 12-B-53—Describes Montgomery Blotite fans and centrifugal blowers, particularly intended for material handling. These are extra heavy, high efficiency fans and blowers to handle the most difficult jobs of air and materials movement.—JACKSONVILLE BLOW PIPE CO.

112 INDUSTRIAL FANS—Bulletin 702—Describes the new Clarage Type XI fans for industrial air and material handling. Covers entire size range—11" through 60" inlet diameters, pressures up to 18" SP, volumes to 130,000 cfm.—CLARAGE FAN COMPANY.

117 AIR CIRCULATOR FANS—Bulletin 484—Describes how air circulators cut fatigue loss in factory and office, and increase production.—THE EMERSON ELECTRIC MFG. CO.

154 AIR EJECTORS—Bulletin, 12 pages—Describes Conesco steam jet air ejectors for modern efficient low cost air removal from condensers, featuring many important design improvements to give positive, efficient operation.—CONDENSER SERVICE & ENGINEERING CO. INC.

156 AIR COMPRESSORS—Booklet 1011—Shows how big jobs can be done with modest air power—equipment and applications of compressed air, with engineering data on 40 to 3500 lb compressor units.—INGERSOLL-RAND CO.

170 PUMPS IN GENERAL—All types of horizontal and vertical pumps—deep-well turbines—boosters, process pumps, non-clog, approved type fire pumps, axial-flow, boiler feed, domestic water and specialty pumps.—PACIFIC PUMPS, INC.

171 CENTRIFUGAL PUMPS—Bulletin 245—Illustrates and describes a line of liquor pumps for process industries. Applications include pumping of hot or cold, erosive or corrosive liquids.—WARREN STEAM PUMP CO.

INSTRUMENTS—METERS CONTROLS—REGULATORS

202 ORIFICE FLOW METERS—Bulletin, 8 pages—Describes orifice meters used for the control of continuous blow-off of boilers, and of similar solids removal from steam and gas releasing surfaces, available in pressures up to 650 psi.—THE MADDEN CORPORATION.

214 STEAM REDUCING VALVES—Bulletin 1A—Describes Atlas regulating valves, particularly the Type B steam-

reducing valve with remarkable wear resisting qualifications.—ATLAS VALVE CO.

245 ELECTRIC THERMOSTATS—Bulletin 1025 describes self-operated, automatic, indicating electric controls for heating and cooling operations. Temperatures held within a degree of point at which user sets dial. For temperatures from minus 90 to plus 650 F.—SARCO CO., INC.

269 CONTROL VALVES AND TRAPS—Bulletin 652—Describes control valves and steam traps for particular application in the heating, compressing and operating of molding presses in plastic molding.—W. H. NICHOLSON & CO.

271 REGULATORS, CONTROLS, VALVES—Bulletin 1009—Is a condensed catalog of Copes feedwater regulators, pump controls, desuperheaters, pressure reducing valves, balanced valves, hi-lo water alarms, etc.—COPES-VULCAN DIV., CONTINENTAL FOUNDRY & MACHINE CO.

282 REMOTE READING BOILER WATER GAGES—Brochure CO—Covers principles, construction and uses of the EYE-HYE remote gage for stationary and marine steam power plants.—RELIANCE GAUGE COLUMN CO.

PLANT EQUIPMENT—WELDING TOOLS—PROCESS SPECIALTIES

304 WOOD HOGS—Bulletin 18-B-53—Describes the Montgomery Rio-Hog for grinding up any kind of wood and various vegetable wastes to produce chips of any desired size, the only all-purpose hog now available.—JACKSONVILLE BLOW PIPE CO.

306 GRAPHIC PANELS—Bulletin PI-153, 4 pages—Shows typical applications of graphic control panels in power plants, petroleum, chemical and process industries. The techniques of graphic symbolism are illustrated, as well as the graphic panel components.—PANELLIT, INC.

309 WIRE CLOTH—Catalog, 103 pages—Gives wire cloth ranges and specifications for grades from 20 x 250 mesh up to 4" openings. Illustrates facilities for fabricating wire cloth parts and fabricated alloys.—THE CAMBRIDGE WIRE CLOTH CO.

311 PNEUMATIC SEWAGE EJECTORS—Bulletin S-50, 12 pages—Describes the Blackburn-Smith pneumatic sewage ejector system used principally to overcome and eliminate the trouble of cleaning screens and pumps and other apparatus—more sanitary, more efficient, more economical, more positive.—CONDENSER SERVICE & ENGINEERING CO., INC.

325 SMOKE STACKS, STEEL OR IRON—Catalog 200-S—Describes types, characteristics, and applications of various smoke stacks.—J. J. FINNIGAN CO. INC.

397 SPRAY LUBRICATOR—Catalog 82S—Covers Manzel equipment for the modern spray method of lubricating punches, shears, knives, dies, conveyors, and other operations. Lengthens die life, keeps work cool and clean.—MANZEL DIVISION OF FRONTIER INDUSTRIES, INC.

PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

410 PIPE HANGERS—Bulletin 183, 13 pages—Describes National counterpoise pipe hangers for high temperature piping systems in steam plants, refineries, chemical plants, and the like. Graphs give aid in selection. Dimensions, erection and field adjustment instructions. Illustrations of typical installations.—NATIONAL VALVE & MANUFACTURING COMPANY.

411 STEAM TRAPS—Bulletin No. 2133, 8 Pages—Includes physical data, prices, on cast iron and forged steel inverted bucket steam traps, air and air relief traps. How to calculate condensate loads.—ARMSTRONG MACHINE WORKS.

416 STEAM TRAP PERFORMANCE—Bulletin T-1746, 16 pages—Describes Yarway impulse steam traps and gives their performance discharging continuously under heavy loads and intermittently under light loads.—YARNALL-WARING CO.

418 PIPING EQUIPMENT—Catalog 51, 56 pages—Describes the design, operation and application of various types of piping, the design and use of adjustable pipe hangers, vibration eliminators and supports.—BLAW-KNOX CO.

433 STEEL UNIONS—Bulletin P-100—Describes the 150 lb SWP "Pic" steel union with bronze seat produced by Dart Union Company, manufacturers of unions for over 55 years.—THE FAIRBANKS COMPANY.

443 REDUCING VALVES—"Atlas Reducing Valve Data Book"—Gives complete information on Type "D" reducing valves of simple design, easy to inspect, adaptable, durable.—ATLAS VALVE CO.

444 PRESSURE REDUCING VALVES—Bulletin 238, 8 pages—Describes and illustrates No. 238 pilot operated pressure reducing valves including illustrations, cut-away views, installation diagrams, tables of capacities and other information. Data on associated equipment.—MCLEARN MANUFACTURING COMPANY.

448 TRAPS FOR ALL MEDIUMS—Catalog 751, 33 pages, is a standard reference on drainage methods for steam, air, gasoline, and gasoline-water—traps are thermostatic, metal expansion, weight and piston-operated for all pressures.—W. H. NICHOLSON & CO.

452 LUBRICATED PLUG VALVES—Catalog, 30 pages—Describes iron and cast steel line of lubricated plug valves, and all accessories. Gives dimensions for sizes from 1" to 36", pressure and temperature ratings, complete service details.—THE OHIO INJECTOR COMPANY.

489 CONDENSATE RETURN SYSTEM—Bulletin 3350, 30 pages—Technical data on various high pressure condensate return systems, with discussion of the effect of turbulence, different types of flow, and air and condensate films. Typical case studies.—COCHRANE CORP.

493 UNIONS AND CHECK VALVES—New Catalog—Shows complete line of Perfect Seal forged steel unions and swing check valves, complete with sizes, pressures, and engineering data.—CATAWINNA VALVE & FITTINGS COMPANY.

497 SEAL VALVES—Bulletins FL and S-1—Describes Okadee full flow valves with perfect seal for fluids and gases, with low pressure drop. Charts and engineering details.—THE OKADEE COMPANY.

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525 HEAVY DUTY VACUUM CLEANING—Survey—To show the advantages of increased productivity, better quality control, reduced fire and health hazards which are possible through the use of U. S. Hoffman Machinery heavy duty vacuum cleaning equipment.—U. S. HOFFMAN MACHINERY CORP.

545 CORRECT LUBRICATION—Lubrication Data Book, 56 pages—Shows the importance of providing and maintaining proper and economical maintenance of all types of plant machinery through adequate lubrication. A valuable guide to superintendents, engineers, managers and others responsible for plant operation and maintenance, particularly for lubrication.—LUBRI-PLATE DIVISION, FISKE BROTHERS REFINING CO.

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584 AIRWAY MARKING PAINTS—Bulletin—Describes Aerox orange and white paint conforming to U. S. specifications for marking airways and similar applications for both metal and wood. This paint is often used in conjunction with Subalox Anti-Corrosive Paint. SUBOX, INC.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

603 MONORAIL CASE STUDIES—File F-1—Offers 30 new studies of engineered monorail applications in various

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606 MONORAIL AND CRANE EQUIPMENT—Booklet—"Economic Material Handling"—Contains 109 pages of time-saving, cost cutting ideas and case histories on handling materials overhead.—THE LOUDEN MACHINERY COMPANY.

610 UNIVERSAL JOINTS—Bulletin CS-10, 8 pages—Describes bevel gear universal joints designed to give positive transmission of torque regardless of shaft angle—from 0° to 185° on vertical center lines, from 0° to 360° on horizontal center lines.—CONDENSER SERVICE & ENGINEERING CO., INC.

611 BELT CONVEYORS—Catalog ID-481A—Describes Continental belt conveyors featuring standard and special idlers and many convenient accessories for application in materials handling.—CONTINENTAL GIN CO.

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Equipment and Review Editor
SOUTHERN POWER AND INDUSTRY
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Atlanta 5, Ga.

8-54-1

Please send me without obligation, free booklets described in the February, 1954, issue of SOUTHERN POWER AND INDUSTRY as circled below.

4	7	9	15	25	29	35	38	55	68	79	83	106	112	117	154	156
170	171	202	214	245	269	271	282	304	306	309	311	325	347	410	411	416
418	433	443	444	448	452	489	493	497	509	517	525	545	576	594	603	606
610	611	627	629	685	693	728	750	778	786	808	833	846	851	873	888	914
921	959	971	992	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12	N13
N14	N15	N16	N17	N18	N19	N20	N21	N22								

Also send further information on following New Equipment (page 104)

B-1	B-2	B-3	B-7	B-8	B-9	B-10	B-11	B-12	B-13	B-14	B-15	B-16
B-17	B-18	B-19	B-20	B-21	B-22	B-23	B-24	B-25	B-26			

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Position

Company Name

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City Zone State

685 POWER TRANSMISSION PRODUCTIONS—Brochure, 8 pages—Discusses flexible couplings, variable speed pulleys and transmissions, universal joints, and gives specifications and information for the application and selection of equipment, all well illustrated.—**LOVEJOY FLEXIBLE COUPLING CO.**

693 ADJUSTABLE VARIABLE SPEED DRIVES—Condensed Catalog No. 148T—For engineers and salesmen in making estimates on speed control for any machine or process. Prices, dimensions, applications for 1/2 hp to 35 hp motors, enclosed, drip-proof standard or special mounted.—**STERLING ELECTRIC MOTORS, INC.**

WATER TREATMENT, HEATING, VENTILATING, AIR CONDITIONING, REFRIGERATION, DUST & FUME CONTROL

728 DEMINERALIZATION—Bulletin 5899, 40 pages—Explains the treatment of water by demineralizing, principles of ion exchange, applications of many anion and cation exchange materials. A series of curves gives estimates of cost, design and operation.—**COCHRAN CORP.**

750 WATER SOFTENERS AND DEALKALIZERS—Bulletin 3415, 13 pages—Describes the double duty, Zoo-Karb water softener and dealkalizer, giving typical water analyses before and after treatment.—**THE PERMUTIT CO.**

778 REFRIGERANT LIQUID SEALS—Bulletin No. 241, 4 pages—Explains operation and selection of inverted bucket liquid seals to prevent gas entering evaporator. Inverted bucket expansion valve hook-ups also shown. Data, prices included.—**ARMSTRONG MACHINE WORKS.**

786 BOILER WATER CONTROL VALVES—Bulletin 308-C, 4 pages—Describes the Camomatic valve for use in controlling feedwater in industrial, utility and service plants. Illustrates and explains applications for automatic water softening, pressure filtering, and other chemical process cycling control.—**BELCO INDUSTRIAL EQUIPMENT DIVISION, INC.**

ELECTRICAL

808 MOTORS, TRANSFORMERS, BRAKES—Form EU-3 in a pocket size data book, giving details and prices on motors, transformers and industrial brakes.—**WAGNER ELECTRIC CORP.**

833 BRONZE BEARINGS FOR MOTORS—Catalog 133—Gives complete specifications of stock bronze bearings particularly intended for application to electric motors.—**THE BUNTING BRASS & BRONZE CO.**

846 LOW-VOLTAGE AIR CIRCUIT BREAKERS—The 50-page Speed-fax Catalog provides digested application information for individually-enclosed molded-case and large air breakers for protection of motors, lighting feeders, etc., up to 600 volts.—**I-T-E CIRCUIT BREAKER COMPANY.**

851 "FUSEOLOGY"—Handbook on Fuses—Intended to help maintenance engineers. Tells what to do when fuses blow, where to look for trouble—what to do after trouble is found—how to select the right type for various circuits—how to choose the proper size of fuse or Fusetron.—**BUSCHMANN MFG. CO.**

873 RUBBER-INSULATED CABLES—Technical Data Book OK-1076, 123 pages—"Rubber-Insulated High Voltage Power Cables Up to 55,000 Volts" deals with advantages, economics, and versatility of this type cable. Contains current carrying capacity tables, aluminum conductor conversion factors, formulas for calculating effects of shielding, dimensional data, installation recommendations, methods for determining conduit size, fill and area, and for bending radii and pulling tensions.—**THE OKONITE COMPANY.**

888 VARIABLE SPEED ELECTRIC POWER DRIVES—Bulletin 171, 4 pages—Gives details of modern variable speed electric power drives, with engineering details of design and application.—**STERLING ELECTRIC MOTORS.**

MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS

914 FLAGPOLES—Catalog 14F—Gives engineering data on "Weldforged" steel flagpoles, describing continuous straight, tapered, and sectional steel flagpoles—construction, ground and roof settings, trucks, bases and ornaments.—**KERRIGAN IRON WORKS, INC.**

921 VACUUM CLEANING—Form A-700, 14 page booklet, describes the greater plant cleanliness, safety and productivity gained through the use of Hoffman heavy duty vacuum cleaning. Applications and installations illustrated.—**U. S. HOFFMAN MACHINERY CORP.**

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971 ENGINEERING SERVICES—Bulletin 1.19.090—Describes design engineering and construction services of J. F. Pritchard for the Chemical, Natural Gas, Petroleum and Power Industries. Includes special equipment section.—**J. F. PRITCHARD & COMPANY.**

992 FIRE PROTECTION—Bulletin 2513 describes Blaw-Knox Deluge systems, wet and dry pipe sprinkler systems, water spray and fog systems, rate-of-rise sprinkler systems, etc., and indicates how a sprinkler system pays for itself out of insurance savings.—**BLAW-KNOX SPRINKLER DIV., BLAW-KNOX CONSTRUCTION CO.**

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418	433	443	444	448	452	489	493	497	509	517	525	545	576	584	603	606
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Also send further information on following New Equipment (page 104)

B-1	B-2	B-3	B-7	B-8	B-9	B-10	B-11	B-12	B-13	B-14	B-15	B-16
B-17	B-18	B-19	B-20	B-21	B-22	B-23	B-24	B-25	B-26			

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Position

Company Name

Street

City Zone State

Continued on page 152

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... says Mr. Floyd Pickard, Chief Engineer at the SKIRVIN. "Temperature always remains where bather wants it. No hot or cold water is wasted. Bathers don't have to get out of their shower because of fluctuating temperatures."

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at the famous SKIRVIN HOTEL are assured by Powers mixers. There's no danger of bathers falling in a slippery tub or shower while trying to dodge an unexpected shot of hot or cold water.

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due to **pressure** or **temperature** changes in water supply lines.

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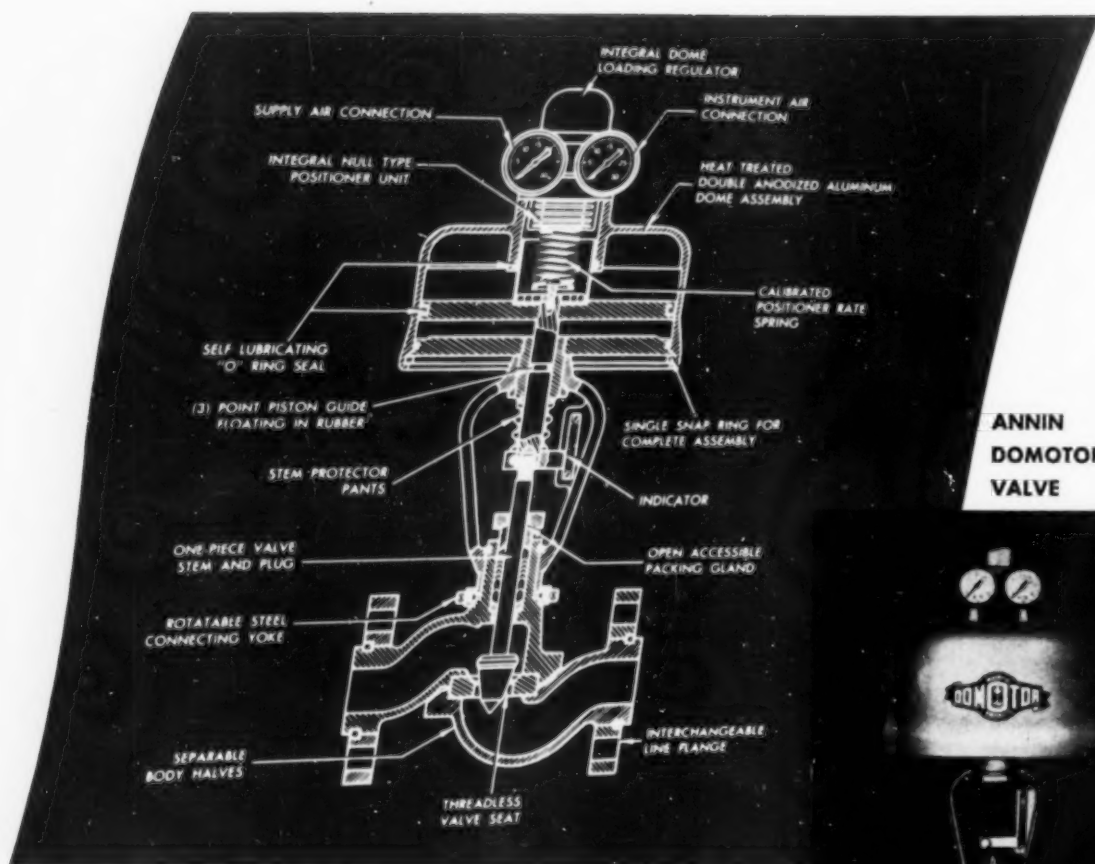
Says Mr. Dan W. James, President and General Manager of the SKIRVIN. "They safeguard our guests from scalding and assure the most comfortable showers obtainable. They cost more. They're worth more."

Public Liability Insurance Will Not Protect Shower Users from personal injuries in showers nor does it, in case of accidents, give protection from damaging publicity or time consuming lawsuits. Include Powers Mixers in your bathroom modernization program. Contact our nearest office, or write us direct for further information.

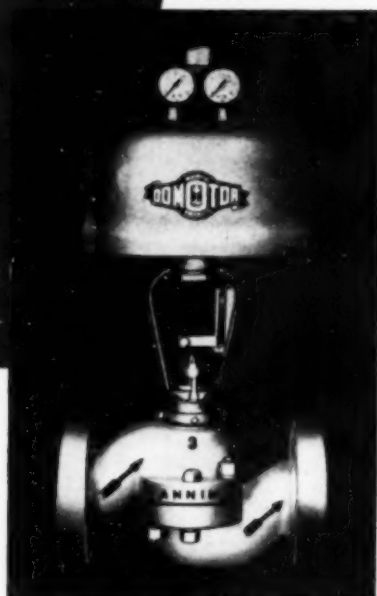
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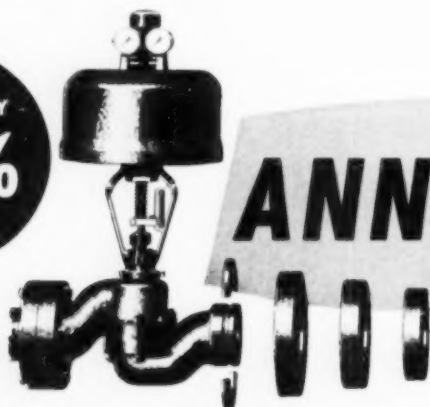
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HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 2

FEBRUARY 1954

Number 1

Amine Film Reduces Condensate Corrosion by More Than 90%

In a plant manufacturing electrical equipment, carbon dioxide and oxygen in the steam condensate were causing numerous piping failures. Corrosion products plugged lines and caused poor space heating by depositing in the heaters and by interfering with trap operation.

The Hall field service engineer recommended that the film-forming corrosion inhibitor Hagafilm* be fed to the boilers for distribution throughout the return system.

Treatment was started during the cold season and by spring all old deposits were cleaned out of the lines and failures were negligible. Test specimens showed a corrosion reduction of 91 and 92 percent at two locations. Weekend overtime work on the return system was eliminated. Trap maintenance was reduced to practically nothing whereas formerly a man had to be kept constantly on that job. Complaints, which had been commonplace before, disappeared as space heating improved. Substantial savings in equipment and manpower were achieved at moderate cost.

The next year, at the end of the first full cold season with treatment, it was reported that considerably less coal was used than during the previous year. There had been no other changes in operation and the weather was comparable.

During the second full cold season over two years after the start of treatment, the plant reported the only failures were two nipples and one tee which had been installed before the start of inhibitor treatment.

*Hagafilm is a registered trademark.

Water is your industry's most important raw material. Use it wisely.

Hall Engineer "Sees Through" Glass Problem

In this glass factory, maintenance costs were running as high as \$75,000 annually. Critical were watercooled "gathering rams," the working ends of which were almost continuously exposed to furnace temperatures of 2,800° to 3,000° F. Deposits and corrosion in the cooling passages had led to overheating and failure.

An investigation by the Hall field service engineer revealed that cooling water flow through the rams was mechanically restricted in places, and that the water feed and discharge lines were poorly arranged and insulated.

Once these defects were corrected, Threshold treatment of cooling water with a few ppm of glassy phosphate proved effective in controlling deposition and corrosion. Now the plant engineer says, "We have forgotten about cooling water altogether."

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire or call Hall Laboratories, Inc., Hagan Building, P.O. Box 1346, Pittsburgh 30, Pa.

Hall Field Engineers "Refreshed" in Pittsburgh

Hall field engineers recently spent a week in Pittsburgh attending an annual refresher course. Twenty sessions were devoted to discussions of the latest technological advances in the field of water conditioning and the engineering solution of specific water problems.

A major purpose of the course was to provide an exchange of information regarding actual situations encountered by Hall field engineers in many different types of industrial plants.

Conductivity Tests Streamlined With New Flow Cell

Hall research engineers have simplified testing for dissolved solids in an eastern utility plant's condensate and feedwater system by development of a new flow cell used in conjunction with an electrical conductivity meter. The compact unit is less than 10" long, and the cell itself is so small that there is practically no holdup to level out differences in conductivity.

One of the advantages evident in use is the ease of removal and installation of the conductivity cell when cleaning or inspection is required. The operator takes the assembly apart quickly and easily because of a specially designed flexible coupling with rubber "O" rings and back-off nuts. A bimetallic dial-reading thermometer is a standard part of the assembly. Aside from the glass cell itself, the principal "wet" components are made of stainless steel.

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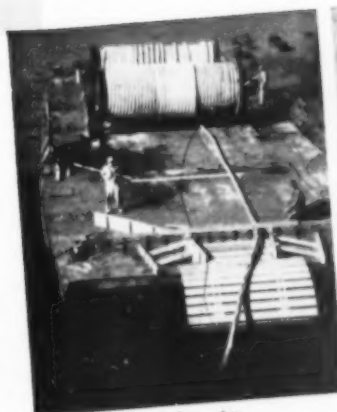
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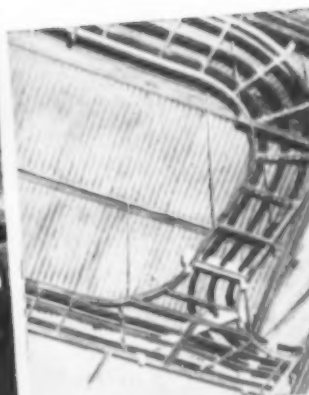
case history

use it anywhere

The versatility of Okolite rubber-insulated high voltage cables is demonstrated by these three typical installations. The first shows an installation of the Portland General Electric Company—two 1,800-ft. 13-kv rubber-insulated submarine cables being laid across the Willamette River. The next shows six 23-kv Okolite-Okoprene transformer leads at The Diamond Portland Cement Company. The bottom, four 390-ft. spans of three-conductor self-supporting Okolite-Okoprene cables at the Covington, Virginia plant of West Virginia Pulp and Paper Company.



..... underwater



..... in racks or conduit



..... on messenger

WHY THEY'RE SWITCHING TO OKOLITE rubber-insulated cables for use up to 35,000 volts

There is a distinct trend among industrials and public utilities toward Okolite rubber-insulated cables for high voltage use.

ADVANTAGES

1. Lighter and easier handling.
2. Eliminates sheath corrosion and fatigue.
3. Simplifies splicing and terminating.
4. Moisture does not affect the insulation.
5. No oil migration at high temperatures or elevations.
6. Flexibility simplifies installation.

APPLICATIONS

1. Transmission and distribution circuits.
2. Generator and transformer leads.
3. Vertical risers and shaft cables.
4. Submarine power cables.
5. Portable substation cables and test leads.
6. X-ray cables.

In the air, underground, underwater, in racks, ducts or conduits, Okolite-Okoprene rubber-insulated high voltage cables can be installed easily and permanently. The design and construction of this type of cable has been proved in all kinds of service for more than 25 years. The entire subject of rubber-insulated cable for high voltage application is covered in the new Okonite 128-page manual illustrated at right. Write for Bulletin SP-1075 on your letterhead to The Okonite Company, Passaic, New Jersey.



OKONITE



insulated cables



1872

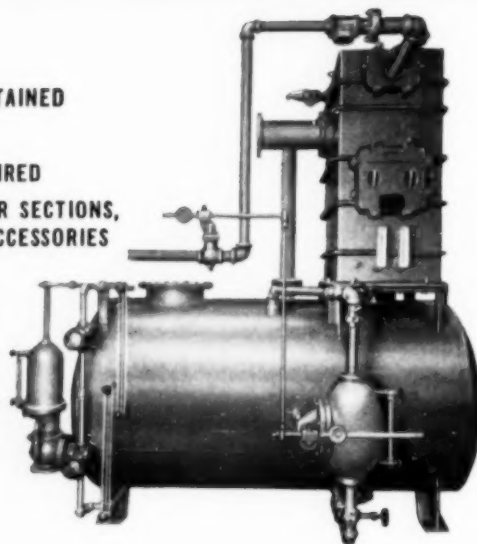
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The UNI-PAC DEAERATOR is designed for both right and left hand installation, and in a wide range of outlet and storage capacities. Accessory equipment is available to meet operating conditions peculiar to the plant and to obtain the results desired.

Publication 4643 contains complete details. Write today for your copy.

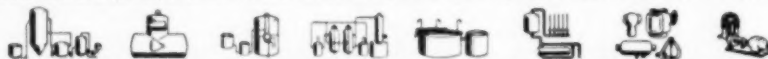
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Heavy chrome plating on shaft at stuffing box is common to both types of Coppus packing.

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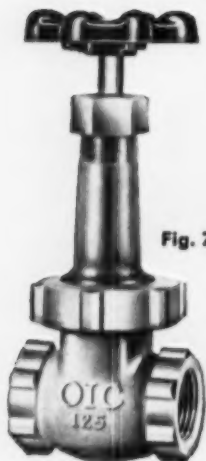


Fig. 7100

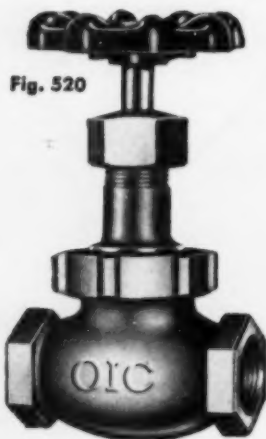


Fig. 520

BRONZE

$\frac{1}{8}$ " to 3". 125, 150, 200, 300 and 350 WSP; 300A; 200, 400, 2,000 and 2,500 WOG.



Fig. 516



Fig. 333



Fig. 1140

IRON

$1\frac{1}{4}$ " to 16". 125, 150 and 250 WSP; 175, 200, 400 and 500 WOG. $\frac{1}{4}$ " to 4" DUO-BOLT Gates.



Fig. 124



Fig. 6033

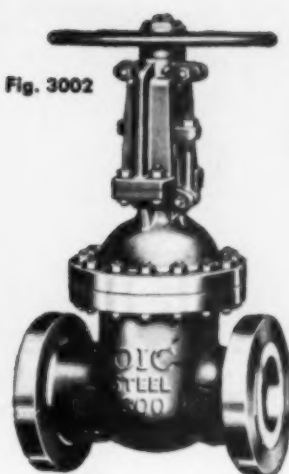


Fig. 3002

CAST STEEL

2" to 16". 150, 300 and 600 lb. primary pressure series.



Fig. 1572

FORGED STEEL



Fig. 1021

Fig. 1221



1/4" to 2" Gate, Globe, Angle, Check Valves; 600 lb. primary pressure series.

STAINLESS STEEL



Fig. 810



Fig. 815

1/2" to 2". Gate valves, 200 lb. primary pressure series.

LUBRICATED PLUG

Fig. 10



1" to 24". Iron... 175 psi to 800 psi working pressures. Cast Steel series 150 lb.-230 psi, 300 lb.-600 psi and ASA 150 lb. class.

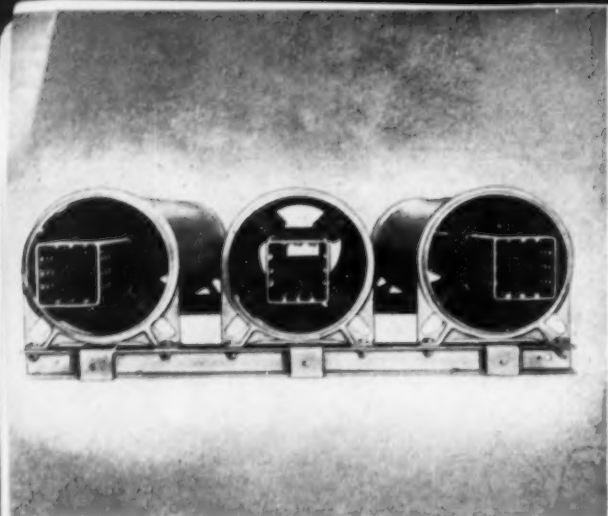
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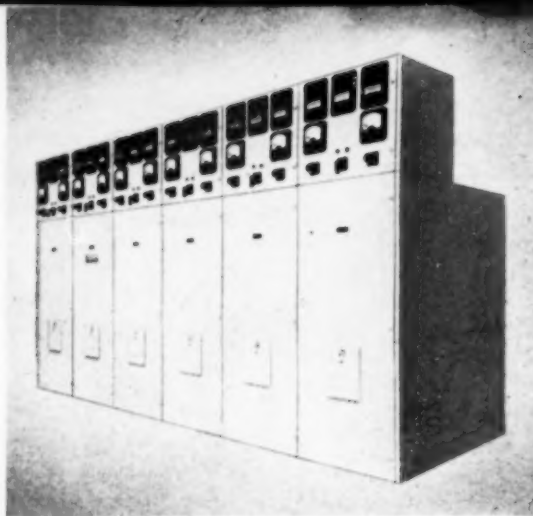
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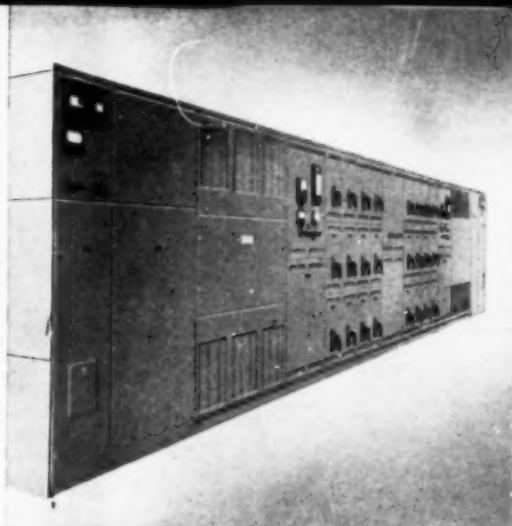


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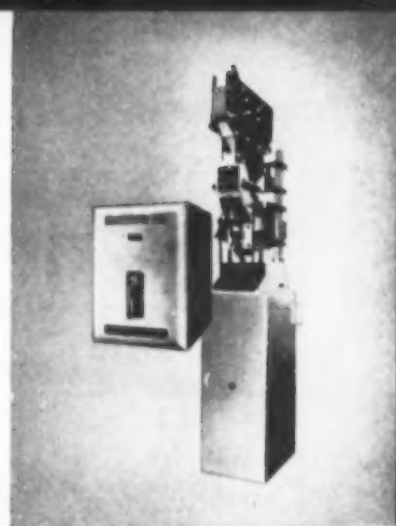




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Power is fundamental in any new plant construction or expansion. Power distribution systems must be planned to assure maximum dependability of service, safety for personnel and equipment, and *over-all* economy—from initial planning . . . through the life of the equipment.

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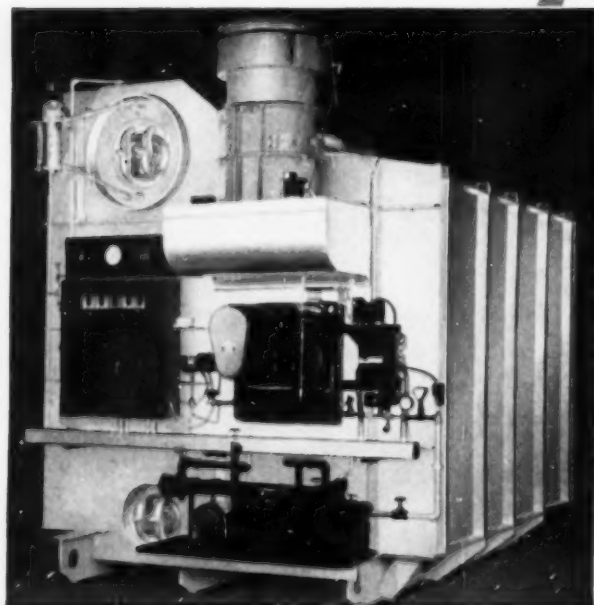
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Plans for 1954 include some \$12,000,000 in new pipe line construction. These lines will be needed to meet the growing demand for natural gas in the South.

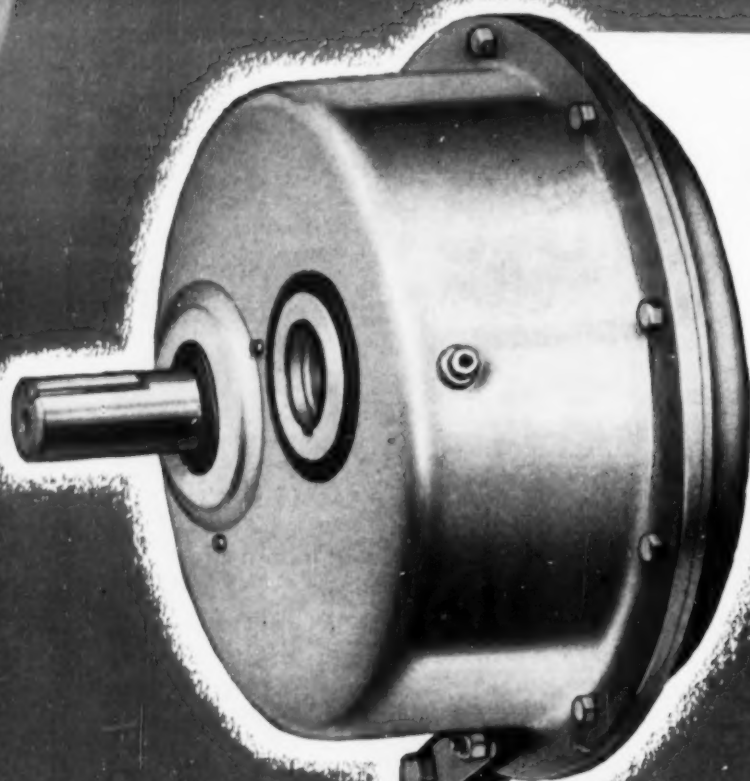
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SOUTHERN NATURAL GAS COMPANY

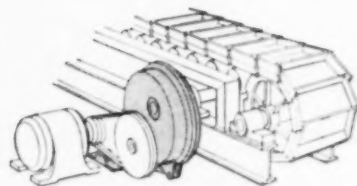
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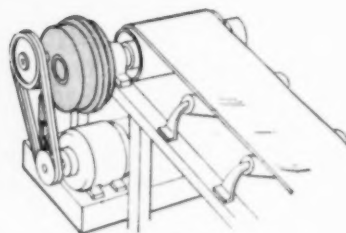
Announcing ...THE **All-Steel**



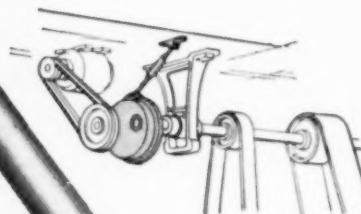
A Few Typical Applications of the new FALK Shaft-Mounted Drive



APRON FEEDER



BELT CONVEYOR



LINE SHAFTING

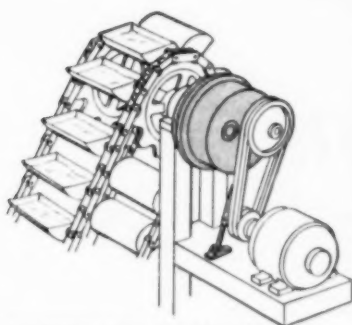
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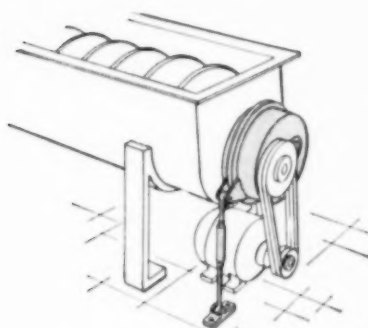
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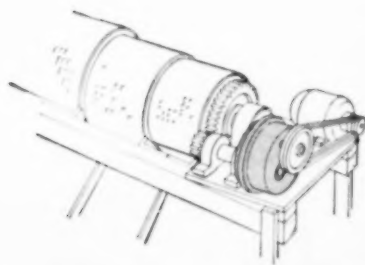
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SAND AND GRAVEL CLASSIFIER

A STURDY, COMPACT SPEED-REDUCING UNIT

Latest in its long list of helical gear achievements, the new all-steel FALK Shaft Mounted Drive has been designed and built specifically for long service life for the many applications where direct mounting of the reduction gear on the driven shaft is desirable.

This compact, versatile speed-reducing unit is backed by 42 years of successful pioneer research and continuous development of helical and herringbone gear products. The Shaft Mounted Drive, new in name only, is a modification in assembly of the top-quality time-proved precision gearing which has won for FALK Speed Reducers and Motoreducers universal acceptance as leaders in this branch of power transmission.

Sturdily built, and possessing the durable strength that all-steel construction alone can provide, the new Shaft Mounted Drive complements and completes the famous "FALK family" of reduction units covering the widest range of industrial applications. For complete information, including application and selection tables, write for Bulletin 7151.

THE FALK CORPORATION, 3001 W. Canal St., Milwaukee 8, Wis.

* Manufacturers of

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

... a good name in industry

Write for Bulletin 7151



Which came first?



THE RAILWAY OR THE HIGHWAY? The answer is—both! For in many Southern communities early economic development was pioneered by the railway. In other areas, roads and highways first served the transportation needs. But either way, *both* railways and highways are indispensable “*created*” resources” of the South today.

Like natural resources, created resources should be cared for and conserved for the use and benefit of all. Certainly the public interest is poorly served when resources of any kind are threatened, damaged or depleted for the selfish benefit of a few.

The South needs good streets and highways—just as it needs strong, efficient, financially-sound railways. Both are basic created resources of this great land—not to be wasted or abused by a few—but to be protected and preserved for the lasting benefit of all.

Harry A. DeButts
President

SOUTHERN RAILWAY SYSTEM

WASHINGTON, D. C.



"AUTOMATIC CONTROLS CUT OUR COAL BILL 20%!"

"We gave our modern coal-heating installation an additional boost in efficiency with automatic controls . . . saved \$600 the first season,"

says R. C. Smith, Manager
Northern Finance Company, Northern Building
Green Bay, Wisconsin



Located in the heart of the city, Northern Finance Company's coal-heated building meets strict smoke control regulations. Burned properly, coal is clean and convenient.

How modern coal equipment can save you dollars

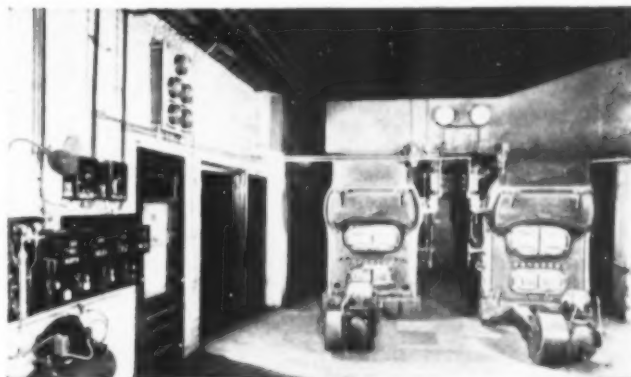
If your plant is more than a few years old, you can probably boost its efficiency and save money with modern combustion equipment. For example, a small investment in automatic combustion controls, or an efficient forced draft system, may bring you big savings in both fuel and labor.

And if your plant is over 10 years old, chances are you can make an even bigger saving. You can save up to 40% on fuel alone by installing modern combustion equipment. You can reduce labor costs substantially with modern coal- and ash-handling equipment.

Call in a consulting engineer. He can give you advice on just what equipment can best fill your specific needs . . . and return you big savings year after year with coal.

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association
Southern Building, Washington 5, D. C.



The stoker-fed boilers and newly installed control panel used in heating this modern office building. Approximately 285 tons of coal are used annually.

If you operate a steam plant, you can't afford to ignore these facts!

BITUMINOUS COAL in most places is today's lowest-cost fuel, and coal reserves in America are adequate for hundreds of years to come.

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

FOR HIGH EFFICIENCY  FOR LOW COST
YOU CAN COUNT ON COAL!

Wagner
TRANSFORMERS
...the choice of leaders
in industry

PAGES 35 A

MISSING I
NUMBER IN

Meet changing load demands with **Wagner Dry-Type Transformers**

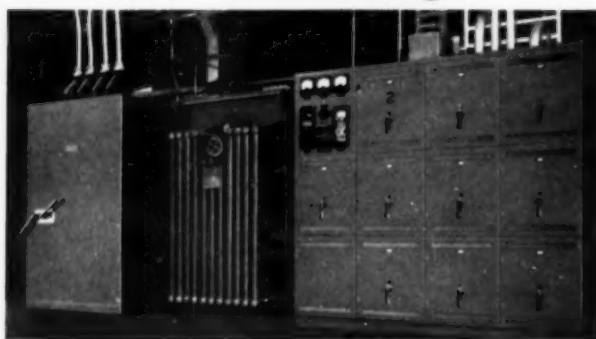
Wagner dry-type transformers can solve your problems by putting the right voltage close to the load wherever machines, portable tools or lights require voltage changes.

SAFE- Wagner dry-type transformers meet all requirements for indoor installation. They will save you money on insurance premiums. Fireproof vaults or other special protection are unnecessary—even where fire hazards are present.

ECONOMICAL- when you use Wagner dry-type transformers, you reduce installation costs—you reduce line losses—you eliminate long runs of secondary copper—and you can forget about maintenance.

COMPACT- Wagner dry-type transformers are small in size—light in weight—easy to install and easy to move whenever changes in plant facilities make it necessary.

Wagner dry-type transformers for textile plants are totally-enclosed for protection against high humidity and are non-ventilated so that lint cannot clog the openings and cause over-heating. These 55° rise transformers are available in single-phase units, 600 volts and below, in sizes 1 through 25 kva. Bulletin TU-201 gives full information.



Unit Substation Transformers *for load-center power distribution*

Wagner three-phase dry-type load-center transformers are built in ratings through 2000 kva in the 15-kv class and below. Transformer and incoming line section are housed in compact factory-matched enclosures, designed for direct connection to matching secondary switchgear to form a closely coupled unit substation that is streamlined in appearance and readily accessible. Complete enclosure of all equipment assures safety against contact with live parts.

Bulletins TU-56 and TU-13 give full information on Wagner Dry-Type and Liquid-Filled Substation Transformers. Write for your copies.



WAGNER ELECTRIC CORPORATION
4383 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE
BRAKE SYSTEMS—
AIR AND HYDRAULIC

T54-1

35 AND 36

G IN
ERING ONLY

HE has it...



the thing you want!

NO NEED to search through directories or ask people about it. When you need a finished bearing, a bar of bearing bronze or any other one of countless items of industrial materials and equipment, just phone your industrial distributor.

YOUR BUNTING distributor is the leading industrial distributor, or a stock-carrying specialist in certain industrial items. With money-saving convenience, he can supply hundreds of different sizes of completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars.

Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

Ask him
for a Bunting
Catalog which gives
complete dimensional
and technical data.



The Bunting Brass & Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

SOUTHERN POWER & INDUSTRY for FEBRUARY, 1954

Wagner
TRANSFORMERS
... the choice of leaders
in industry

Meet changing load demands with **Wagner Dry-Type Transformers**

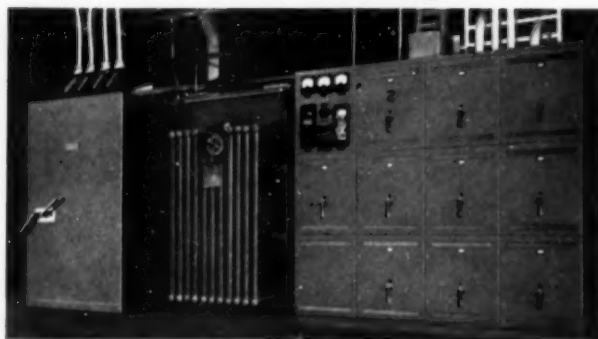
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4383 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE
BRAKE SYSTEMS—
AIR AND HYDRAULIC

T54-1

HE has it...



the thing you want!

NO NEED to search through directories or ask people about it. When you need a finished bearing, a bar of bearing bronze or any other one of countless items of industrial materials and equipment, just phone your industrial distributor.

YOUR BUNTING distributor is the leading industrial distributor, or a stock-carrying specialist in certain industrial items. With money-saving convenience, he can supply hundreds of different sizes of completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars.

Bunting®

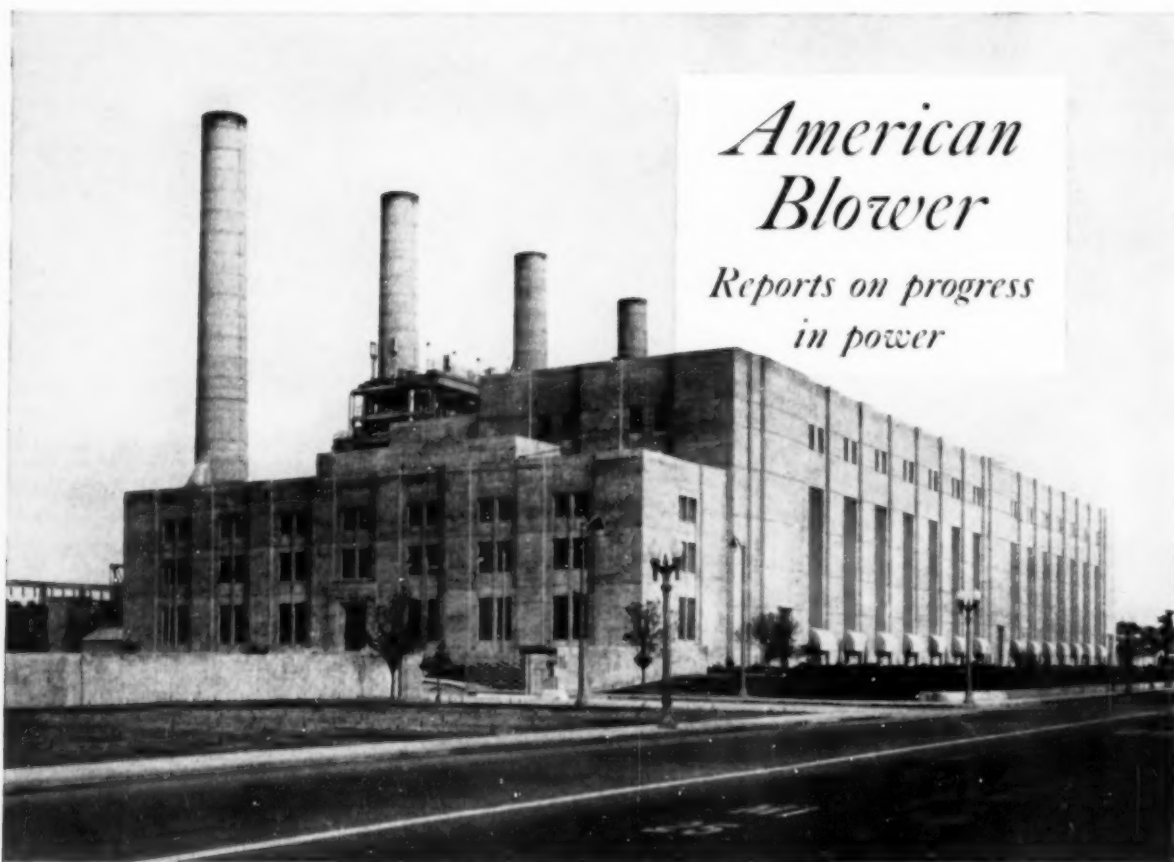
BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

Ask him
for a Bunting
Catalog which gives
complete dimensional
and technical data.



The Bunting Brass & Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

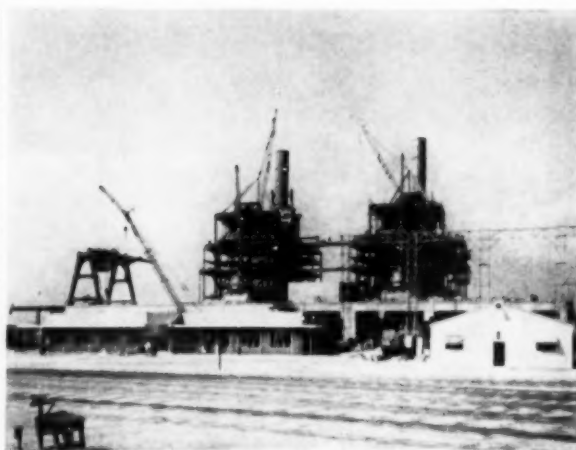
So. Cal. Edison plans ahead with



Southern California Edison Company's Redondo Steam Station, completed in 1949, has a generating capacity of 288,000 kw.



Construction is now under way on Redondo Steam Station No. 2. When completed, it will have two 156,000 kw. generating units.



Etiwanda Steam Station has two generating units with a capacity of 250,000 kw. They went into operation in 1953.

Serving home and industry: **AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS &**

\$490 million expansion program

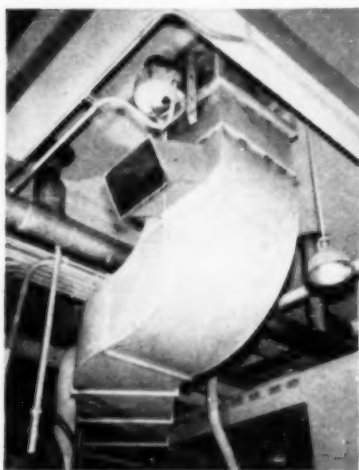
Keeping pace with the record growth of its service territory in Central and Southern California is a full time job for the Southern California Edison Company.

Since 1945, Southern California Edison has spent \$490,000,000 for plant expansion alone. And the end is not yet in sight. When the first units at Redondo Steam Station No. 2 and the El Segundo Steam Station are completed, the Company will have a total generating capacity, both steam and hydroelectric, of a mighty 2,329,420 kilowatts.

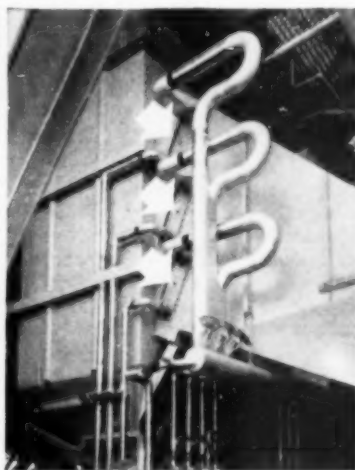
American Blower products played an important part in Southern California Edison's expansion plans. If you are planning to modernize or expand, let American Blower's wide experience work for you. Consult the nearest American Blower Branch Office or write us direct.



American Blower Induced Draft Fans are installed at Southern California Edison's Etiwanda Steam Station.



American Blower Tubecial Fan is designed to supply a wide range of volumes at medium pressures.



Southern California Edison's Etiwanda Station uses American Blower Heavy Duty Steam Coils (arrows).



Redondo Steam Station relies on American Blower IIS Fans to efficiently supply and exhaust air throughout the entire building.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN • CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS



It's a good thing for you that Mrs. MacTavish was on the school board

The plans for the new school building were all completed and were now being shown to the Board.

"And why," asked Mrs. MacTavish, "should the new building burn oil instead of coal?"

"Well," explained the architect very patiently, "oil saves labor."

"So does a stoker!" snapped Mrs. MacTavish.

"And oil is clean."

"No cleaner than coal if you use the right grade and burn it right. What's more, you can always get coal and maybe you can't get oil. Remember how the schools over at Jamestown had to shut down for weeks at a time during the war be-

cause they couldn't get oil?"

"Anything else, Mrs. MacT?"

"Indeed there is. I always save my big reason till the last. Coal's a sight cheaper."

"Oh now, Mrs. MacT., I don't think there is so much difference."

"When it comes to spending money, I don't want to think — I want to know. The Chesapeake and Ohio Railway has a combustion engineering service — absolutely free, mind you. Let's get their man to come in and give us facts — not opinions."

The C&O combustion engineer's carefully documented survey proved beyond doubt that coal

would not only save several thousand dollars a year in fuel cost, but that the installation itself would be cheaper.

"There should be a Scot on every civic board," snapped Mrs. MacTavish. "We're the only people left who seem to care a hoot about the taxpayer's pocketbook."

Chesapeake and Ohio Railway



COAL...FUEL OF THE FUTURE

Bring your fuel problems to C & O

As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

Write to:
Coal Traffic Department
Chesapeake and Ohio Railway
2112 Terminal Tower
Cleveland 1, Ohio

Quick and
clean to apply

UNIBESTOS®

PIPE INSULATION

IS EASY TO USE . . . WON'T CHIP,

BREAK, POWDER OR FRAY



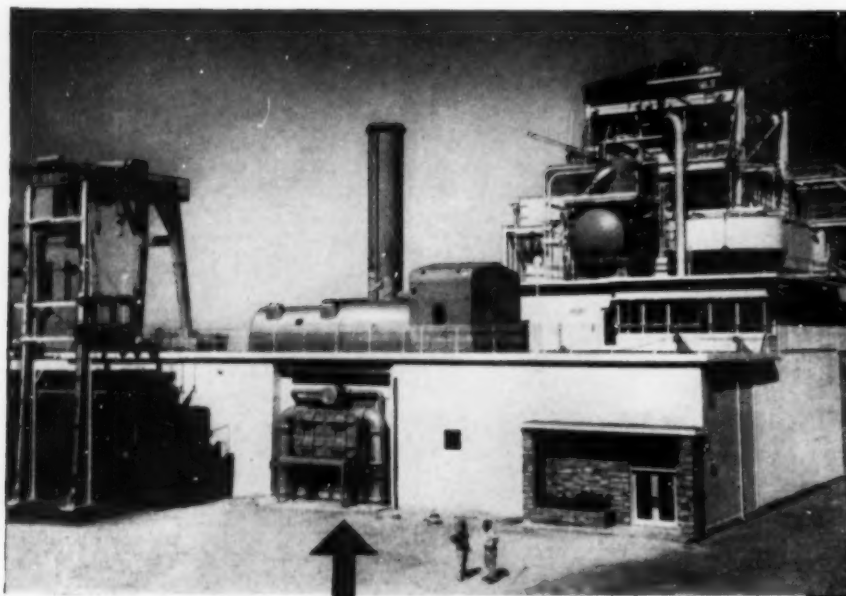
UNIBESTOS
IS RUGGED.
IT STAYS
ON THE JOB



UNION ASBESTOS & RUBBER COMPANY

DEPT F2, 332 SOUTH MICHIGAN AVENUE, CHICAGO 4, ILLINOIS

Salt River Power District Installs I-R Rectangular Condensers in unique, outdoor-type steam plant



**NEW KYRENE
POWER PLANT,**
designed to take
advantage of
Arizona climate
conditions, saves
valuable under-
turbine space with
**Ingersoll-Rand
Rectangular
Condensers**

This 27,500 sq. ft. I-R Rectangular Condenser serves Unit No. 1, a 30/33,000 kw turbine-generator, at the new Kyrene Steam Plant of the Salt River Power District.

The new Kyrene Steam Plant, near Phoenix, Arizona, is the latest addition to the Salt River Power District's combined steam, hydro and diesel power generating system.

Designed and built by the Bechtel Corporation, the Kyrene Station differs from the conventional outdoor installation in that the maintenance shops and auxiliary equipment are under cover for the comfort and convenience of operating personnel. All other elements of the station are of the outdoor type resulting in maximum economy of construction for the Arizona climate.

Unit No. 1—a 30/33,000 kw turbine-generator with throttle conditions of 850 psig, 900F—is supplied by a 350,000 lb. per hr. steam generator, designed to burn natural gas automatically, fuel oil manually, or coal or lignite on conversion. The turbine is served by an Ingersoll-Rand Rectangular Condenser containing 27,500 sq. ft. of cooling surface. Condenser cooling water is handled by two I-R

vertical pumps handling 25,800 gpm. Condensate is handled by I-R vertical pumps.

Unit No. 2, now under construction, will have a rating of 60/66,000 kw. It will be served by a 47,500 sq. ft. I-R Rectangular Condenser, also of two-pass and vertically divided design. The condensate and circulating pumps will again be supplied by Ingersoll-Rand.

These Ingersoll-Rand Condensers save valuable space because their *rectangular design* makes the most efficient use of the rectangular space available below the turbine. And installation cost is minimized because they are completely assembled in the shop, then shipped in large sections, completely flanged for easy erection without any field fitting or strength welding.



Ingersoll-Rand

868-4

11 BROADWAY, NEW YORK 4, N. Y.



What is the CASH VALUE of Experience?

To you, the cash value of *our* experience could mean thousands of dollars. We've had the opportunity to analyze thousands of tubing installations because we are the world's largest manufacturer of tubular steel products. Over the years, we've kept records of our findings. We are happy to offer you the advantages of this unique and valuable "experience file" at no cost to you.

You may be having trouble with high pressures, corrosion, heat, or exposure. Well, before you make a definite decision on your tubing requirements, give us a chance to help you.

No matter how new and unusual your problem appears to be, we may already have the answer to it in our case history "experience file."

The next time you are ready to order tubing, whether in carbon, alloys or stainless steel, consider National Seamless Pipe and Tubing. This applies whether you are rehabilitating present equipment or expanding your facilities. Do *yourself* a favor. Bring your problems to "tubing headquarters." Write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.



NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)

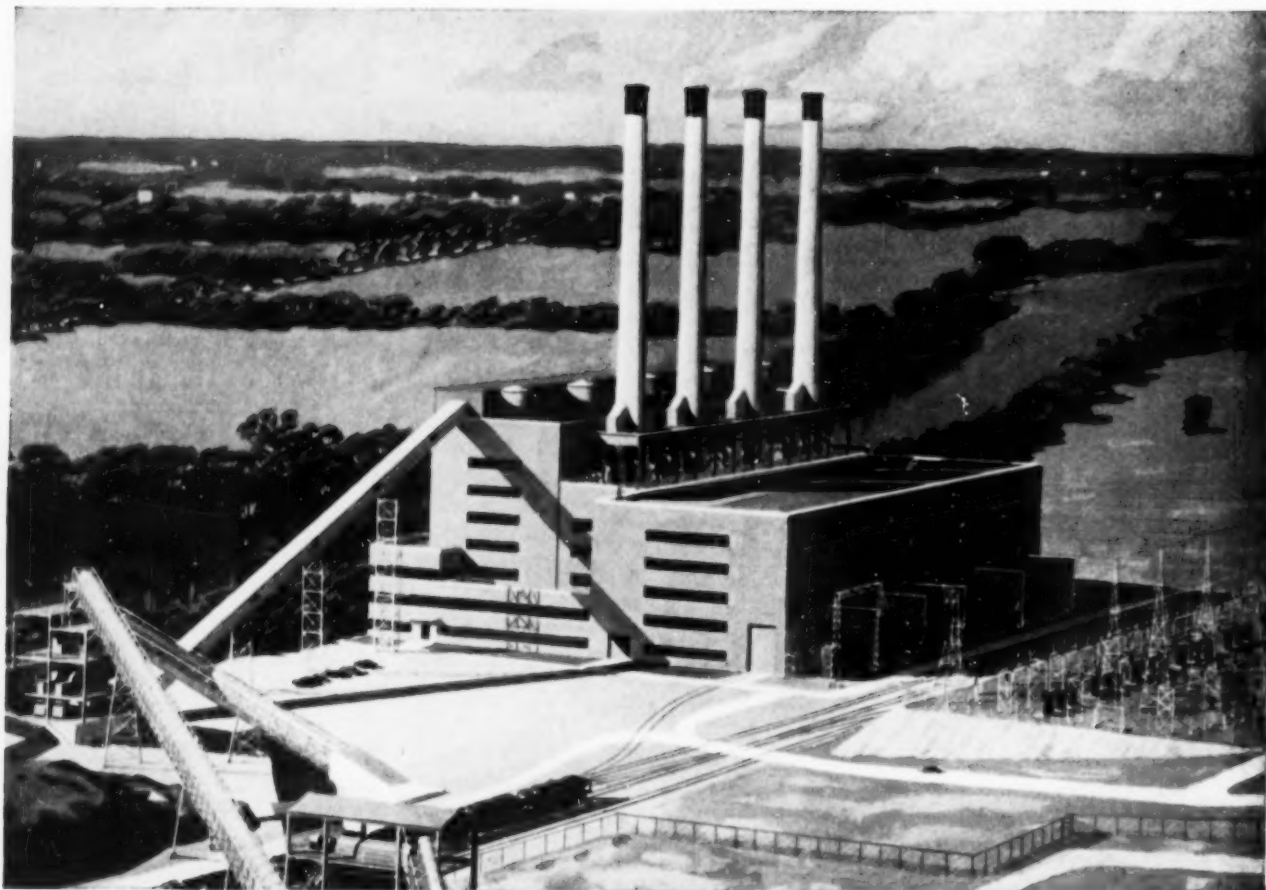
COLUMBIA GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* PIPE AND TUBES



UNITED STATES STEEL

New Wabash River Station of Public Will Boost System's



NEW WABASH RIVER STATION, West Terre Haute, Ind., of the Public Service Company of Indiana, Inc., designed by Sargent & Lundy, Inc., consulting engineers, will have four Foster Wheeler reheat-type steam generators with the following capacity:

Maximum continuous capacity

Primary steam flow.....700,000 lb per hr
Reheat steam flow.....624,000 lb per hr

Operating pressure

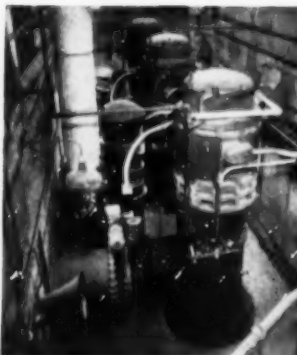
Superheater outlet1500 psig
Reheater outlet401 psig

Final steam temperature.....1005 F

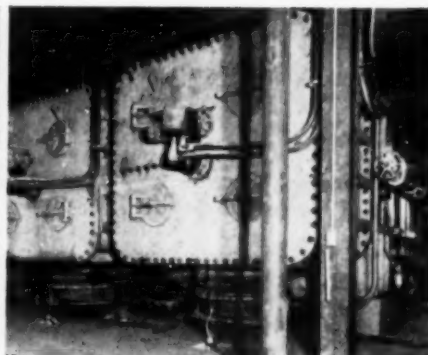
Final reheat temperature.....1005 F

Feed water temperature.....451 F

Coal pulverized by Foster Wheeler ball mills, two for each steam generator.



Foster Wheeler vertical circulating pumps, two of which provide a total of 62,000 gallons per minute of cooling water to each condenser.

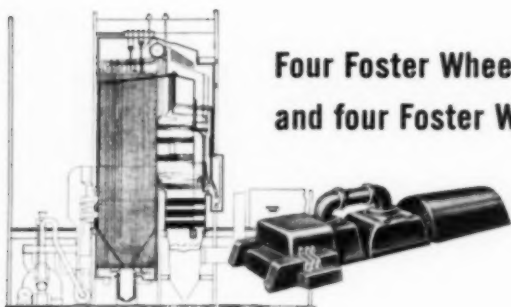


One of four "double-flow" Foster Wheeler condensers, of the 70,000 sq ft rectangular, two-pass design.

Service Company of Indiana, Inc.

Output Capability to 940,000 kw

...with four reheat cycle steam generators!



Four Foster Wheeler 700,000 lb/hr reheat steam generators and four Foster Wheeler 70,000 sq ft "double-flow" condensers will serve turbines each with a gross generator output of 100,000 kw.

Designed to operate on the reheat cycle, the four Foster Wheeler steam generators at the new Wabash River Station of the Public Service Company of Indiana, Inc. will have an aggregate capacity of 2,800,000 lb steam per hr.

The use of combination radiant and convection superheaters makes possible precision control of final steam temperature over a wide load range. Since superheating is done partly in the radiant section, the gas temperature leaving the furnace can be sufficiently reduced so that, even with the Indiana coal used, complete freedom from furnace slagging is assured.

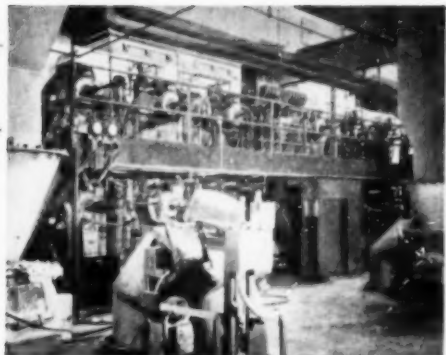
An all-convection reheater is located deep in the low-gas-temperature zone beyond the convection superheater

section. Here safe metal temperatures are maintained during starting, shutting down and under emergency operating conditions. Reheater final steam temperature is controlled by regulation of by-pass dampers located at the economizer outlet.

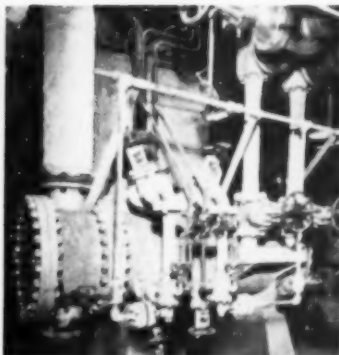
Outstanding features of the "double flow" type condenser are its inherent deaerating action and its complete utilization of available headroom. Also incorporated is a special provision for reversing the circulating water flow, thereby providing a desired cleaning action of condenser tubes.

FOSTER WHEELER CORPORATION, 165 Broadway, New York 6, N. Y.

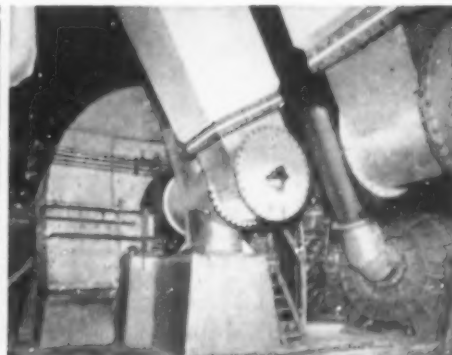
FOSTER WHEELER



Firing aisle of one of the reheat boilers shortly after initial start-up.

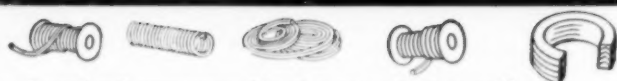
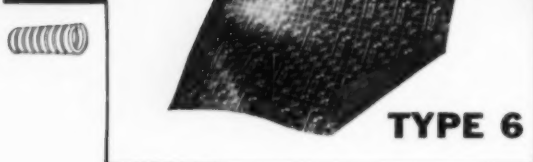
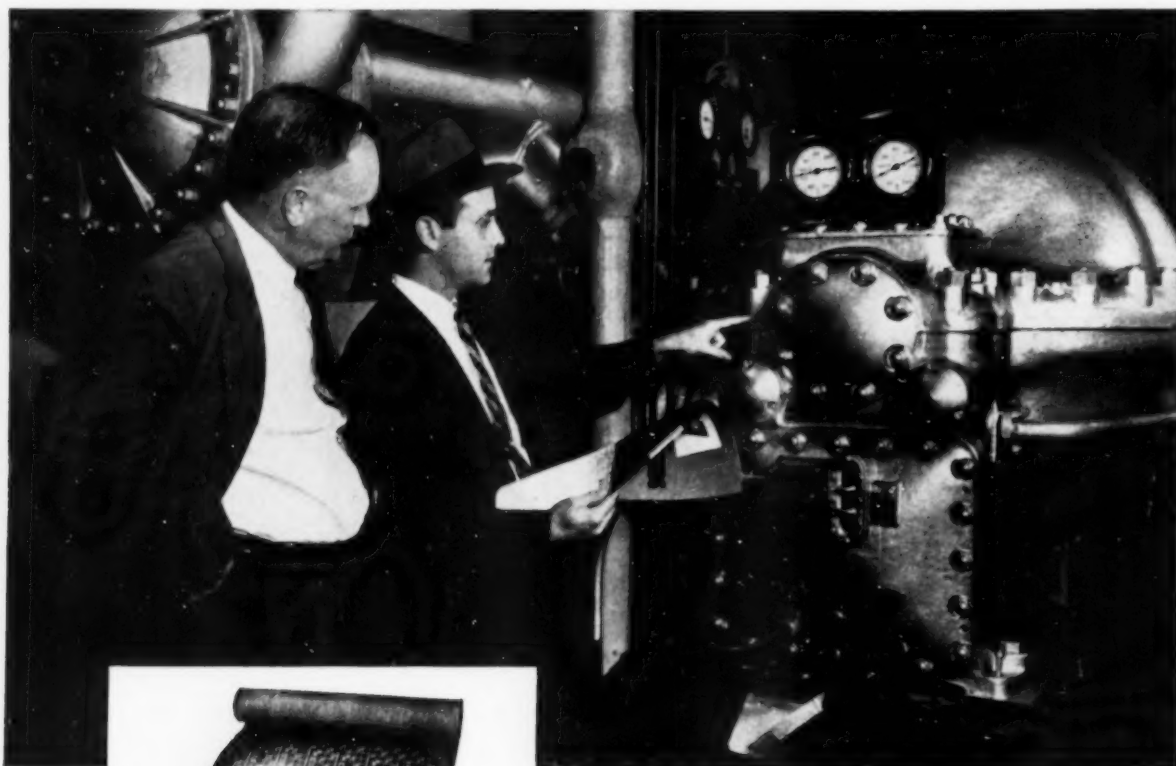


Twin-element two-stage steam-jet air-ejector, with combined surface inter- and after-condensers, maintains vacuum in each 70,000 sq ft condenser.



Exhausters and ball mill pulverizers located on basement level.

R/M's **BIG 7** Packing Types meet 95% of all packing needs



Centrifugal compressors like this one, which is used to air-condition a huge office building, give top performance with R/M Packing No. K-68, a gasket material included in Type 6 of R/M's "Big 7" Packing Types.

Let R/M lower your packing inventory

If you are under the impression that you must stock 10, 20, 50 different types of packings, get acquainted with the distributor who sells R/M's "Big 7" Packing Types. R/M's "Big 7" Packing Types have so simplified the whole packing picture that your plant can probably standardize

on just three or four. This basic line of just seven field-tested packing types is engineered to give custom built performance in all but the very rarest packing applications. It can reduce your downtime, cut your maintenance costs, simplify your ordering. Call in your R/M distributor today.

R/M PACKINGS FOR MAINTENANCE PURPOSES ARE SOLD ONLY THROUGH AUTHORIZED R/M DISTRIBUTORS

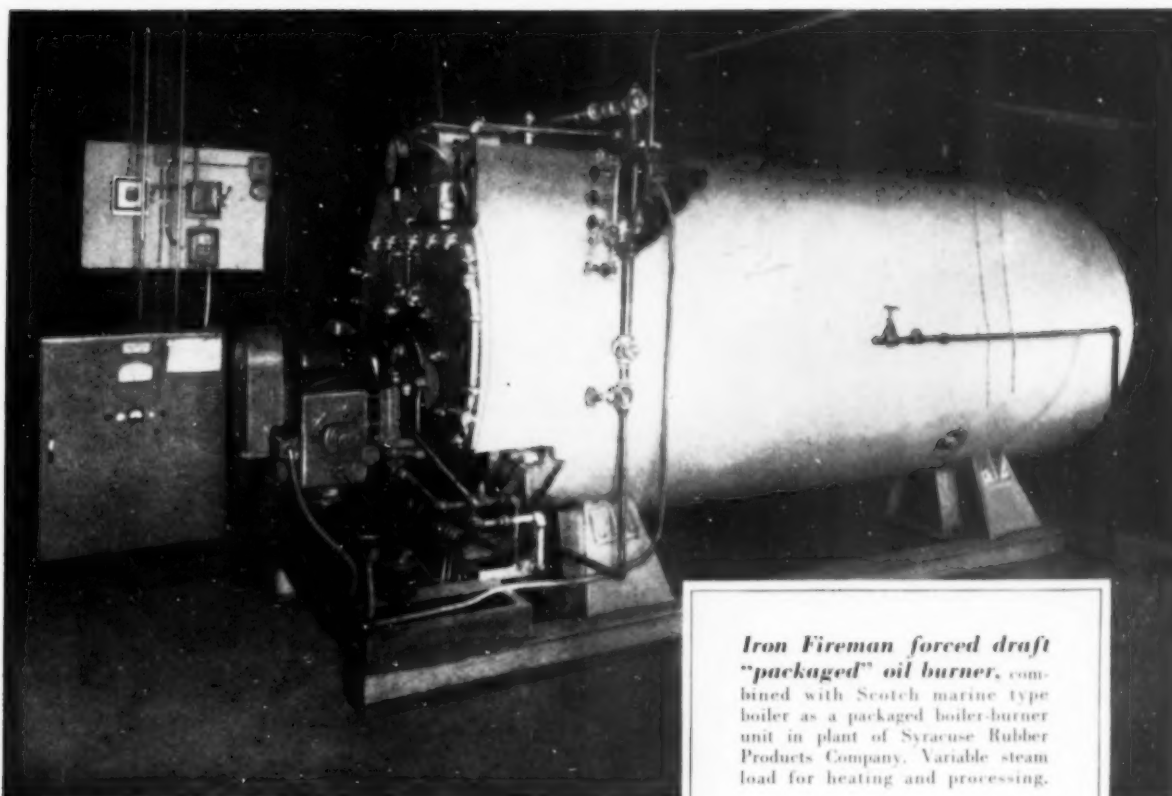


RAYBESTOS-MANHATTAN, INC., PACKING DIVISION, MANHEIM, PA.

BIG 7 PACKINGS

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada.

RAYBESTOS-MANHATTAN, INC., Packings • Asbestos Textiles • Industrial Rubber, Engineered Plastic, and Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Bowling Balls



Installation by R. C. Drexler, Goshen, Ind.

Iron Fireman forced draft "packaged" oil burner, combined with Scotch marine type boiler as a packaged boiler-burner unit in plant of Syracuse Rubber Products Company. Variable steam load for heating and processing.

Boiler capacity doubled ... no increase in fuel cost

That's the experience of Syracuse Rubber Products Co., Inc., Syracuse, Indiana, with IRON FIREMAN packaged oil burner

This new steam plant, with complete oil firing system by Iron Fireman, carries twice the load of the old one. Steam pressure has been stepped up from 90 to 125 psi. In spite of this doubled output, "the cost is about the same as the previous plant to operate," says Mr. Hubert R. Anglemeyer, President. "We also have drier steam in our processing, which cannot be measured in dollars. We have had no down time. Dependability of equipment and ease of operation and maintenance are outstanding."

For further information mail coupon, or call your Iron Fireman dealer.

Iron Fireman advantages

- 1.** Packaged burner unit (for oil, gas or oil-gas combination firing) is assembled and tested at factory instead of on the job. No divided responsibility for burner, electrical wiring, control system, oil heating equipment.
- 2.** Applicable to nearly all types of boilers.
- 3.** Continuous high combustion efficiency.
- 4.** Forced draft. No high stack needed with Scotch or sealed firebox boilers. Requires only vent pipe.
- 5.** For gas or oil, or both. Combination burner shifts fuels at a moment's notice.
- 6.** Burns low cost oils (No. 6 or lighter).



Old steam plant out—new one in—steam up—all within 36 hours. Scotch marine boiler with Iron Fireman packaged oil burner being rolled into the plant of the Meadowweet Dairy, Tacoma, Wash. This unit was in operation just 36 hours after the crew walked in to dismantle the old boiler—a graphic example of savings in labor and production time. Installation by Lawler Boiler & Heating Co., Tacoma

IRON FIREMAN MANUFACTURING CO.
3049 W. 106th Street, Cleveland 11, Ohio

Please send detailed information on Iron Fireman packaged burner units for oil, gas, and oil-gas combination firing.

Name
Address
City State

Iron Fireman®

OIL, GAS OR COAL FIRING FOR HEATING, PROCESSING, POWER





The Small Valve THAT DOES THE **BIG JOB**

Here's what you get: Extra protection against excessive stress with new extra-strong stem and wedge-gate connection . . . super-hardened seat rings of stainless steel . . . forged body and yoke (and bolted follower that has no threads to corrode) . . . plus Malcomized gate faces that won't seize or gall. Made in sizes from $\frac{1}{2}$ " to 2" inclusive, with choice of rising stem with yoke, or with inside screw. Bonnet joints either gasketed or metal-to-metal. Pressure range: 2,000 lb. at 100°F. — 380 lb. at 1,000°F. For higher pressures, specify List 990. Write for Catalog 10.

The CHAPMAN VALVE MFG. COMPANY
INDIAN ORCHARD, MASS.

LIST 960

CHAPMAN

Timely Comments



Successful PRODUCTION CONTROL Programs

Basic principles more important than paper work

SEVERAL times recently, I have had occasion to overhaul production control programs. Each time it was apparent that the application of basic principles was more important than formal procedures or paper work. "Cheaper by the Dozen," a well worn, well known, but very appropriate phrase, can be the foundation for a successful production control program.

Twelve Essential Features

1. Sales Prediction—Made by the Sales Department based on their previous experience of markets and customers probable demands, reconciled to likely market trends.

2. Product Analysis—Performed by a Production Planning facility consists of breaking the Sales Prediction into products and models, the amounts of each required, the materials required, the machine facilities and personnel necessary to produce the products by a scheduled date.

3. Purchasing—Done by the Purchasing Department according to specification and requirement. Based on thorough knowledge of supply sources, costs and material availability.

4. Raw Material Supply Control—Performed by another Production Planning function consists of keeping records to ascertain that materials are either available or on order to meet the scheduled production.

5. Warehousing of Material and Purchased Parts—In reality this is the physical portion of Raw Material Supply Control requiring a close working relationship with Supply Control and Purchasing.

6. Operations and Routings—Done by Production Engineering function consists of specifying Operations, their sequence, and tools, dies and equipment necessary to perform prescribed operations.

7. Tool and Die Control—Tool supply of expendable tools is a function of Production

Control. Availability of necessary tools and dies is a cooperative function of Production Engineering, Tool Design and Tool Room Machining.

8. Production Scheduling—Accomplished as a Production Planning function using available information on Operations and Routings, Tool and Die Control, Raw Material Supply and Time Study to establish a time table so as to know what phase of the work is under way at a given time.

9. Dispatching—A Production Planning function using previous information to get each job and operation under way so as to meet scheduled time.

10. Quality Control—Usually a subordinate function of Engineering it ascertains that work is done according to specification at a marketable quality level.

11. Expediting—A follow up function of Production Planning to ascertain that plans and functions have been executed as scheduled.

12. Cost Accounting and Control—An Accounting function determines that Cost Standards and Budgets are being met and if not, instigates action to assure that they will be met in the future.

Forms or paper work although essential, in themselves accomplish little and those to be used in putting these "Dozen" principles into practice are purely the responsibility and according to the tastes of the individual.

The organization of the main functions are important and their authority, its source and their responsibility and its limitations are to be well defined.

These comments on production control systems are by PAUL BROADSTONE, who has authored several semi-technical discussions for SP&I. Mr. Broadstone is now methods engineer, Bryant Heater Division of Affiliated Gas Equipment, Inc., Tyler, Texas.

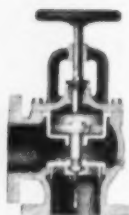


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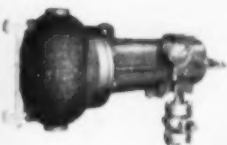
Stop and check control — used with two or more boilers — automatic safeguard against reverse steam flow.



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McALEAR controls you benefit from a background of fifty years of experience covering every type of installa-

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Industry Speaks

SOUTHERN POWER
AND INDUSTRY

Mutuality of Interest

The community, for good or bad, is very much a part of every local enterprise.

Adapted from comments by **Hobart C. Ramsey**, president, **Worthington Corporation**, before a meeting of the civic clubs of Decatur, Alabama.

Production of 3, 5, 10 and 15 ton packaged cooling units is scheduled early this year in Worthington Corporation's new 170,000 sq ft Decatur, Alabama, factory, designed and constructed by **The Austin Company**. Factory construction techniques were reported in SP&I for January, 1953, pages 54-55.

"THE PRESENT seems to me to be a very good time for all members of a team to work together and to recognize their mutuality of interest. The days of easy selling are over. When demand exceeded supply—as it did during World War II, after World War II, and into the Korean War—the heavy responsibility fell on the production man. Competition expressed itself chiefly in competition to produce—to manufacture—to get things built and made. But we are now moving deeper into a different kind of territory—a tougher kind of competition. There is a new premium on efficiency, low costs, fast delivery, better service and all the things that put a company out ahead of the procession.

"It does matter to you—as you very well recognize—that we do business for our Decatur (Alabama) plant. That's what brings the payrolls here. It is important to you how well we succeed in the competitive race. The more we do here the more we must spend here. You have a great deal to gain from our progress—and from the progress of other business and industrial citizens of Decatur.

"There are communities which have not discovered the wise part they can play in the encouragement of the enterprises within their gates. Either they feel no responsibility for the success or failure of their industries or they actually handicap them. I have known of localities (although fortunately not in Worthington's own experience) where the attitudes of local people have been so much of a hindrance that local companies, in spite of the heavy costs of doing so, move away. They move

to towns like Decatur, taking their payrolls, taxes and other contributions to the communities' welfare with them.

"There are many forces in a community which can encourage or put a brake on local initiative and achievement.

"I will put **public opinion** first. If the people in a community—the population generally—are cordial, a company operates in a very favorable psychological climate. It is encouraged. It has a fine labor market to draw on. Local management executives have no feeling that they are carrying a heavy load of public disapproval. I have known communities where this spirit did not exist and I know what it means to local managers. Since it takes two to make a bargain, let me say promptly that the corporate citizen has to do its part to **deserve** a favorable climate of public opinion.

"I will put **press attitudes** next—because I have also seen communities where for one reason or another the press leadership was unfriendly (sometimes understandably, by the way). Local people were actually encouraged not to respect and value the local enterprises—and the local enterprise lived in constant fear of a bad press. The importance of a constructive, progressive, public-spirited press can scarcely be over-estimated.

"There are other important **leadership groups**—formal and informal—which set the tone of a community. You seem to us to have been very fortunate in Decatur to have a notably aggressive and public spirited business, financial, and industrial leadership.

"I would certainly add to my list the attitudes of **political leadership**. Every business manager knows how much trouble can result from thoughtless political leaders—troubles that get expressed in the form of delays, needless expenses, troublesome regulations and various kinds of harassment.

"I touched upon **labor supply** when I referred to the value of harmonious relations generally. But **this needs emphasis**. A community whose working people are friendly and understanding has an asset of great value. A community whose **labor leadership** recognizes that labor is a member of the team—not an opponent—can give an enterprise a great deal of help. There are communities where this is not so—and in many such communities existing enterprises are either tempted to withdraw or are unwilling to grow. New enterprises do not enter such communities if they can help it. They can't be competitively efficient where there is a spirit of antagonism on the part of so important a member of the team as labor."

Design and performance data on first postwar controlled circulation reheater unit . .

Controlled Circulation Station

Virginia Electric and Power Company . . No. 3 Unit at Chesterfield

THERE WERE many reasons for using a controlled circulation boiler in the latest extension of Virginia Electric and Power Company's Chesterfield Station. The many operating advantages will be outlined in this discussion, but the consideration we particularly wish to emphasize in this presentation is that this type of design was selected in order to save some money.

For nearly seventy years, American public utilities maintained an enviable history of continuously lower selling prices for electric energy. This progressive reduction of rates was maintained through periods of war, depression and inflation, almost until now, but recently a number of utilities have been compelled, regrettably and regrettably, to increase their charges to the consumer.

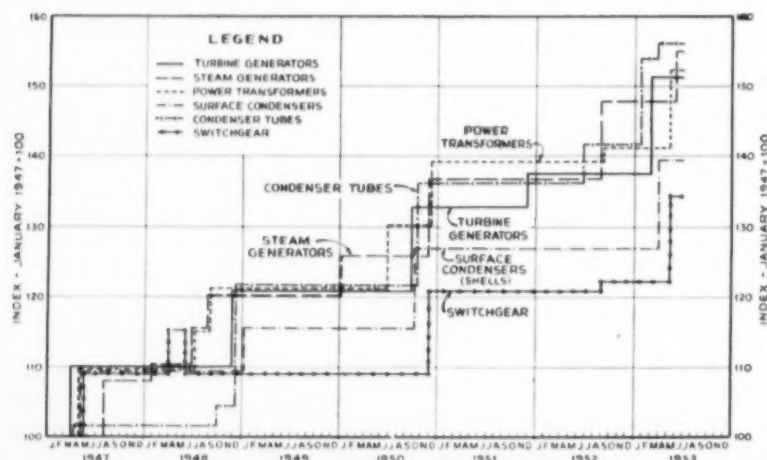
In combatting inflation, higher thermal efficiencies have helped to offset rising fuel costs, and larger units have reduced the significance of higher wages; but the factor which engineers have been able to overcome only partially is the rising cost of plant. Fig. 1 shows the trend of major power generating equipment prices during the past few years and shows what the designing engineer has to contend with in his efforts to produce reliable and efficient capacity at reasonable cost.

Controlled circulation reduced construction and operating costs. Performance report on No. 3 Unit, Chesterfield Station, indicates dependable capacity and freedom from operating difficulties.*

The Chesterfield Station is a strictly utilitarian design. It was started during World War II and, in the first section, every effort was made to economize on materials, particularly steel. The walls are of uninsulated corrugated asbestos; for Unit No. 1, built during the war, this material was mounted on wood girts. In spite of its economical design, the building is not unpleasant architecturally.

Inside, the economy of construction shows up rather sharply, and the interior of the turbine room is

Fig. 1. Percentage price changes for power station equipment. January 1947 = 100



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* Abstracted from two papers presented at the Annual Meeting (Dec. 1, 1953) of American Society of Mechanical Engineers: "Controlled Circulation at Chesterfield," by T. E. Crossan and W. F. Ryan; and "The Controlled Circulation Boiler," by W. H. Armacost.

not remarkable for architectural beauty, as shown in Fig. 2. Nothing was spent for aesthetic effect. There are no tiled walls or even tiled floors, but complete protection is provided from the weather encountered in Tidewater Virginia, at minimum cost. The savings which can be effected by out-of-door construction dwindle rapidly in the face of a building cost as low as this, and the added expense of

out-of-door operation and maintenance would be difficult to justify.

While Virginia Electric and Power Company spends no money for glamour, it has never hesitated to pioneer when convinced it was getting more kilowatt capacity, more kilowatt-hours, greater safety, or a substantial saving in investment and operating costs. It was among the first of the utilities to accept the straight unit principle of de-

sign with a single boiler per turbine and no cross connections. Since the adoption of the preferred standards, it has never purchased any other kind of turbine generator.

It is the company's experience that standard machines provide more for the money than other types, and the same philosophy of seeking the maximum return on investment led to the selection of controlled circulation to provide steam

Controlled Circulation Features

1 General

- (a) Positive circulation before applying heat.
- (b) Controlled circulation in exact proportion to calculated heat distribution.
- (c) Steady water level on quick load swings.
- (d) Quick response to load demands.
- (e) Greater time available to act in event of tube failure due to small tubes and low discharge rate from rupture.
- (f) No loss of turbine capacity on tube rupture until load reduction can be planned.
- (g) Quick access to furnace due to rapid cooling and short outages for repairs.
- (h) No hideout of solids in boiler water.

2 Furnace-Wall Surface

- (a) Use of small diameter tubes:
 - (1) Low weight of tubes.
 - (2) High velocity in tubes.
 - (3) Results in thin wall tubes.
 - (4) Low hot face temperature of tubes.
 - (5) Low thermal stress in tubes.
 - (6) Lower total stress in tubes.
 - (7) High factor of safety in tubes.
- (b) Circuits may be arranged either vertically or horizontally.
- (c) Tube circuits may be of unequal length or unequal heat absorption.
- (d) High permissible heat absorption rate.
- (e) Minimum of time and expense for wall tube repairs when necessary.
- (f) All welded construction.
 - (1) Elimination of rolled joints.
 - (2) Elimination of handholes and gaskets.

3 Boiler Heating Surface

- (a) Greater design flexibility:
 - (1) Horizontal multipass extended surface may be used.
 - (2) Cooling panels in superheater zone of multipass arrangement may be conveniently used.
 - (3) Water-cooled spacers and supports may be used for superheater, boiler and economizer.

4 External Circulating System

- (a) Low circulation rate is used in boiler surface and high velocities used thus:
 - (1) Small number and size of downtakes.
 - (2) Small number and size of risers.
 - (3) Improving steam quality.

5 Boiler Drum

- (a) Low total circulation results in:
 - (1) Few drum nozzles for downtakes.

- (2) Few drum nozzles for risers.
- (3) Small space required for baffles and other internals.
- (4) Small amount water to separate from steam.
- (5) Low number steam-separator units.
- (6) Small-diameter drum.
- (7) Thin drum wall.
- (8) Large access space for given diameter.

6 Structural

- (a) Furnace wall tubes small in diameter and thin, resulting in:
 - (1) Low water weight in operation.
 - (2) Low weight of structural supports.
 - (3) Small amount weld metal to be deposited in erection.
 - (4) Low load on foundations.
- (b) Use of water-cooled spacers and supports reduces special alloy structural members.

7 Maintenance

- (a) Low cost in replacing portions of tubing due to small diameter thin-wall tubes.
- (b) Time saver because of quicker start-up, shutdown and cool-off periods.
- (c) Quick and low amount of acid required for cleaning if found necessary.
 - (1) Less acid required and less time to drain.
 - (2) Less treatment time when circulating pumps are used.
 - (3) Quick flushing and neutralizing operations due to use of pumps, and because small amount water required to fill boiler.
 - (4) Ease of inspecting tubes by cutting out samples before and after cleaning.

8 Operating Economy

- (a) Large part of circulating pump power goes into boiler as heat.
- (b) Low weight of pressure parts and water results in less fuel required to place unit in operation.
- (c) Time saved in heating-up and cooling off, and short outages, means long operating time.

9 Flexibility of Operation

Operating experience has indicated that flexibility and ease of control of controlled-circulation boilers is of great value in time of emergency. For example, owing to the small tubes used, a tube failure does not cause a violent disturbance and does not result in damage to adjacent parts and equipment. Also, owing to the positive controlled circulation, the circulation is not disrupted in other parts of the boiler. Therefore, it is not necessary to drop load immediately; rather operation may be continued for several hours.

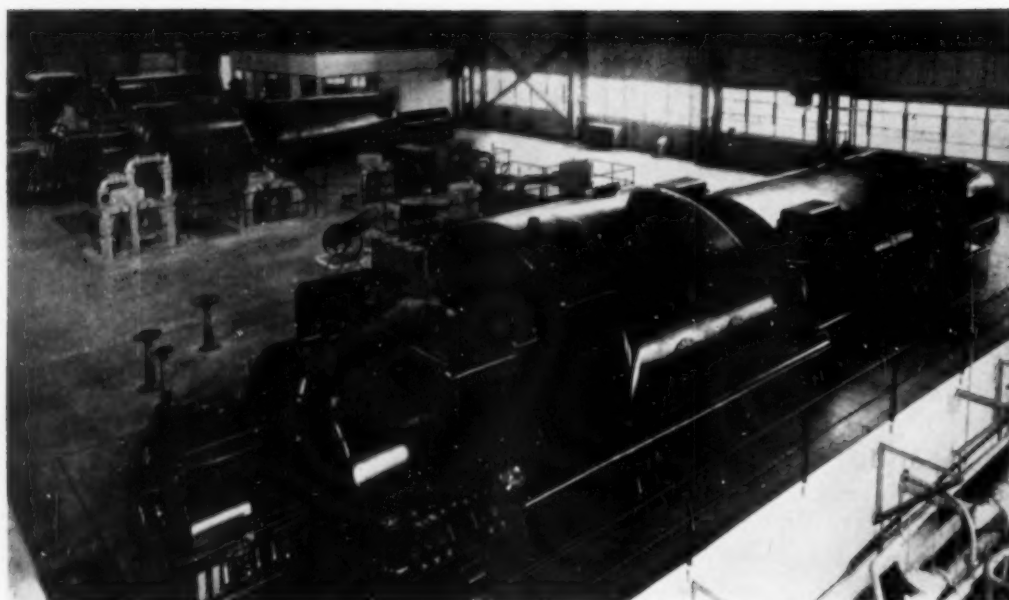


Fig. 2.
Turbine
Room
Interior
Chesterfield
Station

for unit No. 3, although it is the first post-Montaup^{*} design of this type.

The general simplicity of the station design is emphasized in the heat balance shown in Fig. 3. There are only five stages of extraction; make-up is provided by demineralizers rather than evaporators, and the final feedwater temperature is moderate (458 F). So are the throttle pressure (1450 psi gage) and the throttle and reheat temperature (1000 F), factors which were fixed by the selection of a preferred standard unit.

Control is not overcentralized. Separate control boards are provided for high tension switching, the boiler, the boiler feed system and the turbine generator. These boards are moderate in size and are not overburdened with dispensable instruments or controls.

Fig. 4 is a line drawing showing the overall dimensions of steam generating equipment for Chesterfield No. 3, and the corresponding dimensions of a natural circulation boiler offered for the same capacity and operating characteristics. The controlled circulation design shows a reduction of more than 30% in required floor area and a reduction of more than 40% in volume. This

would be of less importance in an outdoor plant but, even in that case, it results in smaller floor area and reduction of weight on the foundations and structural steel. The weight of the Chesterfield No. 3 boiler is 1,000,000 lb less than the weight of an alternative natural circulation design. The saving in supporting steel and foundations can readily be visualized.

That the savings in plant cost were obtained at no sacrifice of capacity or reliability, and that the expected operating advantages have been realized, is clearly demonstrated by operating results.

The Boiler

The controlled circulation boiler installed at the Chesterfield Station is rated at 750,000 lb of steam per hr at 1500 psi gage, 1000 F initial steam temperature and 1000 F reheat. A cross section of the unit is shown in Fig. 5.

This was the first postwar controlled circulation reheat unit to go into operation, and it is the lowest pressure controlled circulation utility boiler to date. The furnace is arranged with center wall and tangential firing with steam and reheat temperatures controlled by tilting burners.

Waterwalls comprise the entire evaporation surface. Water from the drum passes through downcomers to the circulating pumps

and thence to headers where it is distributed to the tubes. This boiler employs the lower distribution-header arrangement, as in the older Montaup unit, but an improved orifice arrangement was installed. Orifice plugs were not used for each tube; rather an orifice holder and screen were installed for each two or three tubes through a seal-welded handhole. This development greatly simplified the installation and maintenance of the units.

Another development in the case of the Chesterfield boiler concerned the circulating pumps. Based on experience at Montaup, pumps of the injection type were developed so that mechanical seals could be installed at a later date. Performance of these pumps is discussed later.

Still another development involved the drum internals. Based on the experience at Montaup, a "centrifugal type" separator was devised. This equipment was previously found to be so efficient that no dry drum was included in the Chesterfield boiler. Operating experiences at Chesterfield have indicated satisfactory steam purity.

Operating Record

The boiler and 100,000 kw turbine generator first supplied energy to the system on November 9, 1952, and were in commercial operation

^{*}The first large high pressure controlled circulation boiler installed by an American public utility was placed in operation in 1942 at the Somerset Station of the Montaup Electric Company. Reported in: *Southern Power & Industry*, Feb. 1943, p. 128.

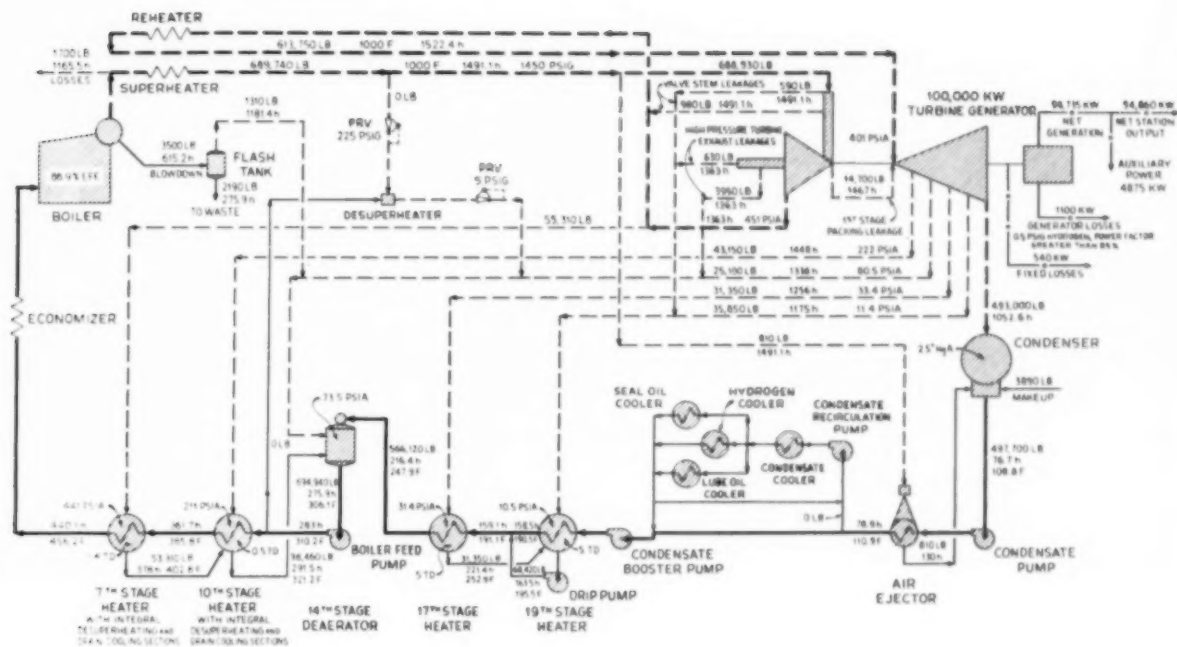


Fig. 3. Heat Balance Diagram, Unit No. 3

as of December 1. From the latter date to November 25, 1953, two outages have occurred, one forced and one scheduled.

The forced outage occurred when a normally latched-in relay, which trips the fires in case of low boiler circulating pump differential, was accidentally de-energized by an electrician attempting to locate a direct current ground. The load on the unit was reduced to station auxiliary power and, as soon as the cause of the trouble became known, the fires were relit and load restored. Approximately 30 minutes elapsed between the start of load reduction and return to full load. Needless to say, the offending relay has been rewired to be normally de-energized.

The scheduled outage, from January 29 to February 4, was made to remove fine mesh strainers from the turbine stop and intercept valves and to complete construction items and miscellaneous changes.

The unit was in continuous operation from Feb. 4 to Nov. 25, when, as a precautionary measure, it was shut down for acid cleaning in preparation for the winter peaks. This cleaning revealed that internal accumulation was negligible. Loading of the unit varies from 35 to 110 thousand kw. Normal load is 105,000 kw from 12 to 18 hours per

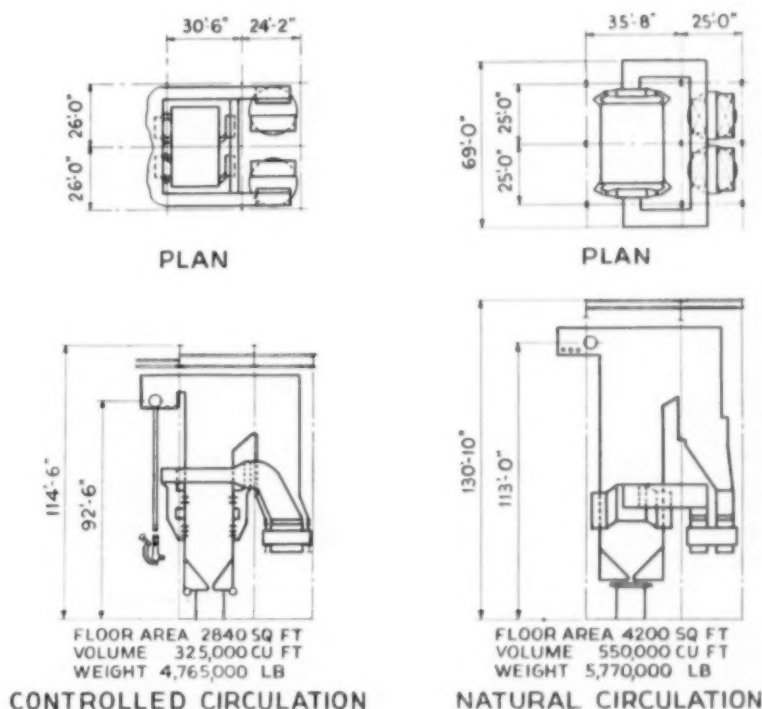


Fig. 4. Sketch showing comparison of major dimensions of controlled circulation and natural circulation boilers. Both are reheat installations—750,000 lb/hr, 1,500 psi, 1000 F/1000 F

day, dropping to a minimum of 35,000 during the early morning hours as dictated by system conditions. Availability of the unit since Dec. 1, 1952, has been about 98.5%.

Operation of the boiler to date has been more than satisfactory.

Maintenance of design initial steam and reheat temperature of 1000 F is readily achieved by means

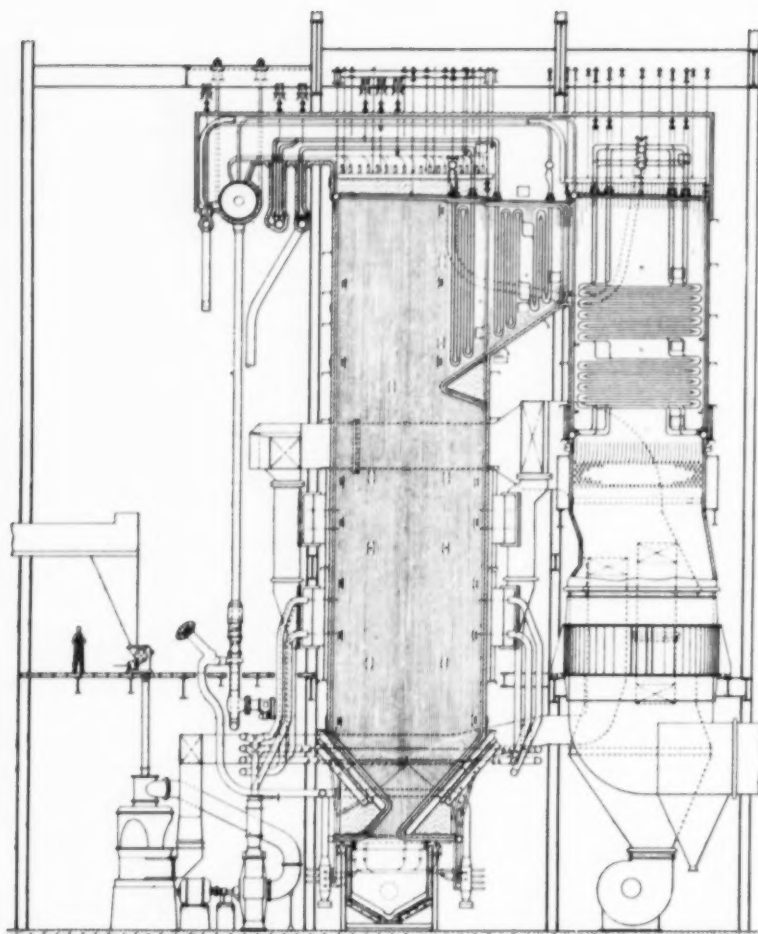


Fig. 5. Cross section of No. 3 boiler

of the combination of automatic burner tilt control and spray at-temperation, with variations normally of about 5 F and not exceeding 10 F at outputs above about 550,000 lb of steam per hour.

The control, especially of steam temperature over sudden and wide variations of steam output is excellent. The practically negligible difference in initial steam temperature from the two sides of the main superheater and the nominal difference from the two sides of the reheater during the large variations in load are especially satisfactory in view of the fact that combustion is being controlled in two separate furnaces.

A feature of interest is the vibration of the center wall tubes at the top. The maximum movement is approximately $\frac{3}{8}$ in., and this action appears to be very effective in keeping the upper part

of the center screen wall free from slag.

Cleaning and Starting

During the period of preliminary operation prior to putting the unit on the line, all possible precautions were taken to provide a commercially clean boiler. Before boiling out, all tubes were pressure flushed with a specially designed nozzle to insure that each tube was free from obstructions.

Boiling out and acid cleaning were accomplished with the secondary strainers and orifices removed but with the master strainers in place. During the draining of acid and water used for subsequent rinses, nitrogen was introduced to exclude air from the boiler. Acid was circulated periodically by a special pump installed for the purpose. When the boiler circulating pumps were not in use during the

acid wash and rinse period, they were pressurized with condensate containing caustic soda, sodium sulfite, and cobalt chloride to reduce the possibility of corrosion of the lower pump bearing.

Subsequent to the acid wash and raw water rinses of the boiler, condensate was used for rinsing in an attempt to reduce the turbidity of the rinse water, but this operation was not successful until the boiler was fired and the water temperature raised to 180 F. The heating of the unit, with the boiler circulating pumps in operation, apparently dislodged deposits of iron oxide and, after two subsequent rinses, the turbidity of the rinse water was acceptable.

After inspection of the drum and headers, all tubes were again pressure flushed and the secondary strainers and orifices installed. The master strainers were removed and a considerable amount of welding beads and trash was found.

Subsequent to closing up the boiler, it was given a hydrostatic test, drained to firing level with nitrogen atmosphere above the water and lit off to raise pressure for blowing out steam leads, setting safety valves and preliminary operation of the turbine. After all the necessary tests had been made, the machine was phased out and synchronized with the system.

Operation for the first two weeks included the usual number of starts and stops for balancing the turbine, repairing leaks, and other details.

Heavy oil was fired during this preliminary period, and the change-over to coal was made during the latter part of November.

Feedwater Treatment

Feedwater treatment has been given careful attention. Total solids in the boiler water seldom exceed 100 ppm. Caustic soda and sodium hexametaphosphate are added to the boiler drum, cyclohexamine at the feed pump suction and sodium sulfite at the condenser hot well. The pH of the feedwater was originally controlled at 8.5, but tests have indicated that 8.8 to 9.0 is more effective in reducing iron and copper pickup in the system. A small amount of boiler water is recirculated through the economizer,

from boiler circulating pump discharge, to maintain the pH of the water in economizer at 9.0 to 9.5.

Initial checks of boiler performance by means of the regular station instruments indicate acceptably close agreement with the expected overall boiler efficiency of 88.7% at design capacity. Studies of various features of boiler operation are under way to furnish information on which to base adjustments of controls to assure optimum results throughout the usual capacity range.

Boiler Circulating Pumps

Since the date of commercial operation, neither capacity nor reliability of the steam generating unit has ever been affected by the boiler circulating pumps. During most of the hours of pump operation, the mechanical seals have not been effective as such, but the sealing of the pumps has been accomplished by injecting water at a pressure slightly above the circulating pump suction pressure.

The maximum time for which

any mechanical seals have been fully effective has been approximately 2,000 hours. A seal failure is not sudden, and the imminence of failure is indicated by a temperature rise in the sealing water cooling circuit. A mechanical seal failure does not limit boiler operation, as sealing water is supplied and the pump continued in service.

During the outage of January 29 to February 4, 1953, all three pumps were completely overhauled and put in first-class condition. Since that time, two of the pumps have been dismantled for inspection. The first pump, inspected in June, 1953, was found to be in good condition; the second, overhauled early in August, 1953, required the replacement of several parts. On this latter pump, there has been some indication that boiler water leaks through the seal and the resultant flashing contributes to the wear of various parts, particularly the breakdown bushing. Steps are being taken to remedy this condition.

More than normal wear of some

pump parts was experienced during the period of preliminary operation. If it were feasible to use fine mesh strainers in the pump suction as is done with boiler feed and other close clearance pumps, in all probability the wear would have been more reasonable during this period when debris was being cleaned out of the system.

The power required by two boiler circulating water pumps, 260 kw, amounts to approximately 5% of the normal auxiliary power.

Conclusions

In conclusion, all concerned are thoroughly satisfied with the choice of controlled circulation for Chesterfield; management, because of the low initial cost and dependable capacity, and plant personnel because of the freedom from operating difficulties. Confidence in the selection of controlled circulation boilers is further reflected in the decision to install three more units of this design to meet future system demands of Virginia Electric and Power Company.

PRINCIPAL EQUIPMENT

Unit No. 3, Chesterfield Power Station, Virginia Electric and Power Company

(This list was not included with ASME Papers)

BOILER EQUIPMENT

Boiler	One—Combustion Engineering, Inc., 750,000 lb/hr at 1,500 psi gage, 1000 F and reheat 675,000 lb/hr at 1000 F
Economizer	One—Combustion Engineering, Inc.
Air Heaters	Two—Ljungstrom, Air Preheater Corporation
Boiler Circulating Pumps	Three—Pacific Pump Company, 4,700 gpm each
Forced Draft Fans	Two—Sturtevant Division, Westinghouse Electric Corporation, 131,909 cfm at 11 in. S.P. each
Induced Draft Fans	Two—The Green Fuel Economizer Co., Inc., 128,000 cfm at 15.2 in. S.P. each
Combustion Control	Bailey Meter Company
Duct Work	Connerly Construction Corporation
Fly Ash Collector	One—Western Precipitation Corporation, Multiclone type
Radial Brick Chimney	Consolidated Chimney Company, 13 ft diameter x 290 ft high
Boiler Feed Pumps	Three—Ingersoll-Rand Company, each 965 gpm at 1,685 psi TDH
Hydraulic Couplings for B. F. Pumps	American Blower Corporation
Generator	One—Worthington Corporation, 628,000 lb/hr with 9.995 guarantee
Closed Feedwater Heaters	The Grisco-Russell Co.
Auxiliary Pumps	Worthington Corporation; Ingersoll-Rand Company
Miscellaneous Tanks	Richmond Engineering Company
Condensate Cooler	The Grisco-Russell Company
Fabricated Piping	National Valve & Manufacturing Company
High Pressure Valves	Walworth Company
Pressure Reducing & Desuperheating Equipment	The Swartout Company
Level & Temperature Control Equipment	The Swartout Company
Coal Scales	Four—Stock Equipment Company, each 20 tons per hour
Coal Handling	Link-Belt Company
Conveyor Belts	Quaker Rubber Company
Ash Handling	United Conveyor Corporation

WATER TREATING EQUIPMENT

Dememineralizing Equipment	Cochrane Corporation, two-bed 40 gpm max capacity
Chemical Feed	Milton Roy Company

TURBINE GENERATOR EQUIPMENT

Turbine Generator	General Electric Company, 100,000 kw, preferred standard, 1,450 psi gage, 1,900 F, 1,900 F
Condenser	Ingersoll-Rand Company, 65,000 sq ft, two-pass, divided water boxes, down-flow type
Condensate Pumps	Two—Ingersoll-Rand Company, vertical, each 1,240 gpm at 130 ft TDH
Circulating Water Pumps	Two—Ingersoll-Rand Company, each 31,000 gpm at 33 ft TDH
Traveling Water Screens	Link-Belt Company
Condensate Tubes	Seville Manufacturing Company
Circulating Water Air Removal System	Nash Engineering Company
Chlorination Equipment	Wallace & Tiernan Co., Inc.

ELECTRICAL EQUIPMENT

Outdoor Oil Circuit Breakers	Westinghouse Electric Corp.
Main Power Transformers	Two—Westinghouse Electric Corp., 135,000 kva main power transformer bank
Station Service Transformer	One—Pennsylvania Transformer Company, 1,500 kva
Main Switchboard	General Electric Company
Station Service Switchboard	Allis-Chalmers Manufacturing Company, 2,400 v
Station Service Switchgear	Westinghouse Electric Corp., 400 v
Gage Boards	G and N Engineering Company

MISCELLANEOUS EQUIPMENT

Electric Freight Elevator	Otis Elevator Company
Air Compressor	Ingersoll-Rand Company
Main Steel	Bristol Steel & Iron Works, Inc.
Corrugated Asbestos Siding	Asbestos Erectors, Inc.
Precast Concrete Roof	Porte Mfg. Co.
Roof Ventilators	The Burt Manufacturing Company
Steel Window Sash	The William Hayley Co.
Switchyard Galvanized Steel	American Bridge Company
Engineers & Constructors	Stone & Webster Engineering Corp.

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GROWING companies, like growing boys, sooner or later reach the point where they're "bursting at the seams." For boys, you just buy them larger sizes. But the solution for expanding manufacturers isn't that simple.

It's often very complex. The producer has to think about keeping his existing plant going as much as possible during the period when his facilities are being enlarged. He may be saddled with a long-term lease on an inadequate site, or his present plant may be antiquated and may not lend itself readily to expansion.

Not the least of his problems are the items of cost and erection time. Will the new construction be too expensive and, therefore, risky in

SEVEN STANDARDIZED BUILDINGS, with an aggregate floor space of 117,600 sq ft were erected on Lee Brothers Foundry Company's 100 acre plant site near Anniston, Alabama. Luria standardized structure design permitted speedy erection of urgently needed production facilities.

terms of added output and profit? Will the planning and erection time be so prolonged that the new facilities would arrive too late?

Such were the questions and problems that confronted Arthur H. and Alfred J. Lee, the twin brothers who have directed the Lee Brothers Foundry Company at Anniston, Alabama, since its inception in 1917.

Furthermore, the problem was complicated by these special factors:

1. The Korean war broke out in

the midst of their expansion plans and set in motion such restraining currents as governmental regulations and limitations on the use of steel and other building materials.

2. They needed sharply increased production facilities in a hurry. Orders for their brass valves and fittings were reaching large proportions and the foundry on 17th and McCoy Streets, several times expanded since 1917, was again getting farther and farther behind on production schedules.

3. The foundry needed structures

with a maximum of unobstructed interior space for long conveyor belts, for a series of melting furnaces, for efficient handling of materials and for adequate and free movement of stored products.

4. They wanted to do their own erection, employing their own engineering department and manpower.

The Lee brothers found their solution in standardized steel-frame structures.

Construction Plan

After preliminary consultations with J. McC. Hill Jr., for Luria Engineering Company, they decided upon a plan of construction on a 100-acre site four miles southeast of Anniston which had been previously purchased for the purpose.

Here are the considerations that led to and justified their decision:

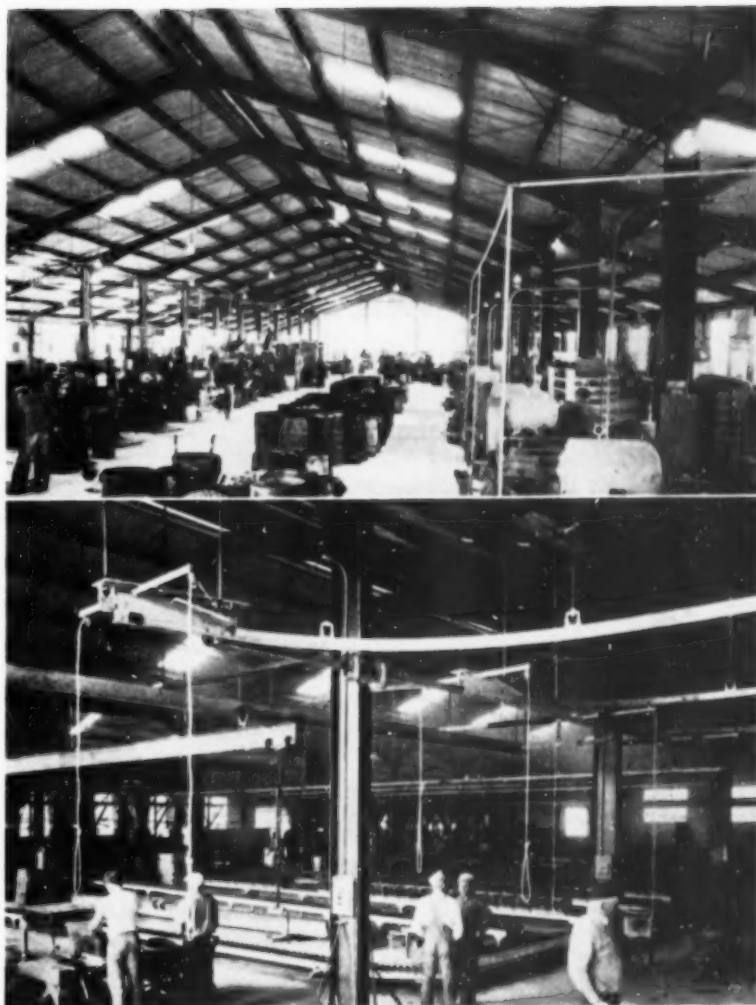
1. Luria had the structural steel necessary during the critical period that followed the outbreak of the Korean war. This was possible because of this company's production system, which entails pre-cutting of standardized structural steel components and collateral materials in advance of actual orders.

2. Substantial savings over conventional construction were effected by the elimination of the usual long and costly planning stage, by the lower structure prices resulting from streamlined and standardized methods of production and by lower erection costs (a relatively small construction crew is required, since the pre-welded structural units need only bolting in the field).

3. Speedy erection was made possible by the simplicity of the construction methods. As a consequence, Lee Brothers not only saved on the manpower and time required for erection but were able to obtain increased output within a few short months. This meant added sales and profits long before they would have been possible had conventional construction been adopted.

4. The standardized steel-frame buildings, with their long spans, provided the unobstructed interior space needed and, at the same time, lent themselves readily to the foundry's specific requirements.

5. Additional economies were made because the foundry was able to employ its own engineering department and personnel to erect the



INDIVIDUALITY of custom-designed plants was attained, because the foundry engineers were able to make specifications to suit their own needs—drawing upon a wide range of standard sizes and types that could be combined into nearly any arrangement desired.

buildings under the direction of Boyd Vaughn, chief engineer.

Seven Luria buildings, with an aggregate floor space of 117,600 sq ft, were erected. Standardized buildings comprised:

1. A 180 x 200 ft metal-covered brass foundry with three clear-span bays of 60 ft each and a height to the eaves of 16 ft.

2. A 60 x 200 ft metal-covered brass foundry with an eave height of 16 ft, and with a 20 ft wide lean-to extending down one entire side of the building.

3. A 60 x 300 ft brass machine shop and shipping building with 16 ft eave height and with a 20 ft wide

(Continued on page 65)

PLANT PERSONNEL

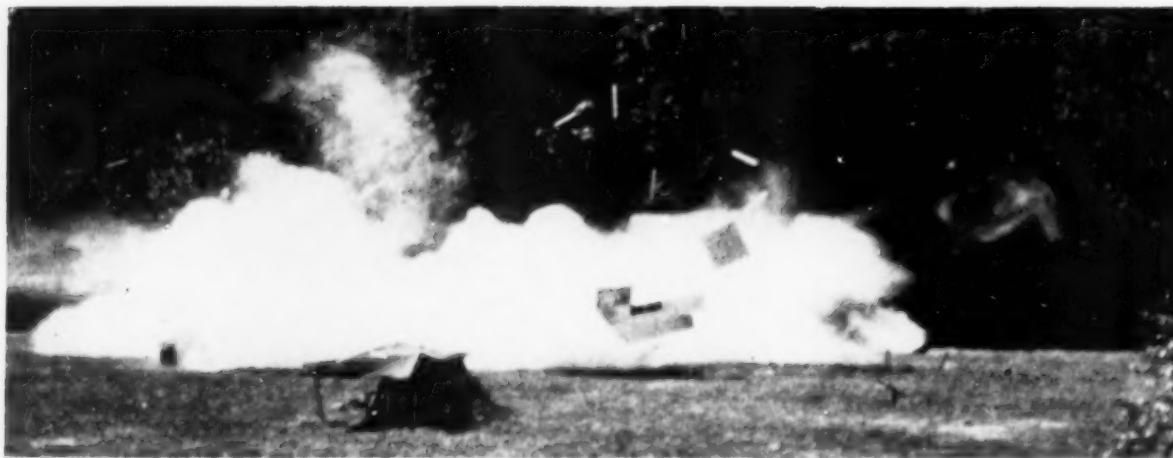
Arthur H. Lee is president and Alfred J. Lee, vice-president of Lee Brothers Foundry in Anniston, Alabama. Other executive personnel are Boyd Vaughn, chief engineer; R. Asa Lloyd, vice president and works manager; R. B. Carr, Jr., plant superintendent; Thomas Nunnelley, assistant plant superintendent; Charles Williams, production manager; William O'Brien, superintendent of night operations; J. C. Sharpe, superintendent of machine operations; and Frank Davenport, manager of the laboratory and metallurgical research.

Lee Brothers Foundry Company is one of the country's leading producers of brass valves and brass and iron pipe fittings, as well as allied plumbing products and brass castings—all marketed nationally through wholesale distributors and jobbers.

In its \$400,000 plant, 560 employees produce 300 to 350 tons of finished and rough brass castings per month. Company's annual payroll approximates \$1,600,000.

**Smaller pressure vessels may offer
your greatest hazard . . .**

HOT WATER Can Take You for a Ride



RESULTS of a hot water tank test conducted by the Watts Regulator Company, manufacturer of temperature-pressure relief valves. Hot water tank constructed for an allowable pressure of about 125 psi was selected. Pressure was built up to about 150 psi and nothing happened but minor leakage. Tank shell was then struck with a sledge hammer. Only violence resulting was a

split shell and a momentary gush of water. Engineers then applied heat and took pressure and temperature readings from a safe distance. A straight pressure relief valve set at 125 psi (no temperature relief) was installed in the tank. At a temperature of about 280 F and at 50 psi, the tank exploded unexpectedly and violently.

Photo courtesy Watts Regulator Company

LET'S TAKE a look at the steam tables. We will find that at 212 F (the boiling point of water at atmospheric pressure and at sea level) something happens. Below that point, each Btu of heat added to water will cause 1 lb to rise 1°F; but at 212 F, close to 1000 Btu's added per pound will not cause any increase in temperature. A change of state occurs, and if the container or pressure vessel is vented to atmosphere, each pound of water will be transformed into steam with the addition of this 1000 Btu's latent heat.

However, if the pressure vessel is filled with water and is closed against any sort of relief, another condition arises. During the foregoing case it must be understood that there will be expansion and attendant increase in

volume as the water is heated. But in the second instance increase in volume is restrained by lack of vents or any sort of relief, so there will be an increase in pressure.

At this point there are two additional facts entering the picture:

(1) This heat input is storing up latent heat energy and,

(2) As the pressure rises above atmospheric in the closed vessel, the boiling point of the water also rises.

For example, the steam tables show that at a gauge pressure of 50 psi the boiling temperature is 298 F; at 100 psi it is 338 F; at 150 psi it is 364 F, etc.

Now it would be well to inter-

ject a question asked at certain engineers' examinations. It is "tricky."

When is a boiler explosion more dangerous—with water at normal level or when practically empty—pressure being equal in both cases?

Puff of Steam

A boiler that exploded with practically no water in it is illustrated. There was a rupture, a puff of steam and that's all, outside of a ruined boiler due to severe overheating. Disregarding an insignificant amount of water, the steam would be dry and somewhat superheated. Assuming 100 psi gauge pressure and 500 cu ft capacity, the heat energy stored up in the steam would be approximately 125 (lb of steam) \times 126

By HARRY M. SPRING, JR.
Consulting Engineer

IF A PRESSURE VESSEL containing liquids above the pressure boiling point is not in safe condition as determined by competent internal inspection, there may be an extreme hazard. The smaller vessels, often inaccessible for this thorough inspection, are sometimes thought of as unimportant. They frequently present the greatest hazard.

IF SERVICE REQUIREMENTS do not demand temperatures above the pressure boiling point of a liquid, limit the temperature automatically and supplement pressure relief with temperature relief.

(the temperature rise in degrees fahrenheit) $\times .5$ (the specific heat of steam). This would equal 7,875 Btu's or a little under 6,130,000 foot pounds.

"Jet Propelled"

In a boiler where the water level was 75% of the volume, there would be about 28,000 lb of water which at 100 psi and 338 F would have a stored up latent heat energy of $28,000 \times 1190 = 33,320,000$ Btu's or 25,922,960,000 foot pounds—3000 times the energy in the practically empty boiler.

There are some practical factors that are disregarded but the figures illustrate the tremendous heat energy stored up and ready to flash into a blast of steam expanding about 1700 times in volume if rupture suddenly reduces the pressure in the closed vessel from 100 psi, 338 F boiling point to atmospheric pressure, 212 F boiling point. The superheated water has to go somewhere and it does. The vessel usually becomes

(Continued on page 65)



THIS BOILER exploded with practically no water in it. There was a rupture, a puff of steam and that's all, outside of a ruined boiler due to severe overheating.

UNCONTROLLED or runaway firing of this hot water heating boiler caused the water temperatures to rise to an estimated 330 F. The relief valve was inadequate to discharge steam generated and this violent explosion resulted.

ALTHOUGH PROTECTED (7) by a straight pressure relief valve, this hot water storage tank exploded because of overheating and runaway firing. Weakening due to corrosion was a second important factor in the explosion. The weakened tank was just about strong enough to stand the hydrostatic pressure of water up to about 200 F. When the temperatures rose to probably well above the 300 F zone, the thermal stresses added to static pressure stresses were enough to cause this serious failure.



**The balanced lineup; like a boxer
rolling with the punch . . .**

Bottleneck Important in Time Study

Visualizing each element of the operation as it relates to the other in the lineup presents a job standard based on economy for the company and fairness for the worker.

By A. BUSH ENOS

Industrial Engineer
Richmond, Virginia

BOTTLENECK is a horrid word to most production men. Its implication as the center of manufacturing traffic jams usually labels it poison.

The fact that a bottleneck can serve as the basis for increasing production may come as a surprise. Yet its use in time standards is commonplace with time study men, although their use of the word does not imply acceptance of a traffic jam.

Time study technique is to build a lineup for specific plant jobs through a projected bottleneck, carrying it along by balancing it with other phases of an operation. The trick is partially to accept that part of the production line which seems to cause a slowdown and partially to overcome it by force, much as a boxer rolls with the punch.

To visualize such a situation, it is necessary to examine the phases of a complete operation, as they compose a manufacturing procedure. Let us use a simple illustration, selecting a familiar process in the meat packing industry, packing smoked hams. The elements of the process are listed below.

- (1) Removing the bare ham from the iron storage rack
- (2) Piercing with a metal trier for smell inspection
- (3) Wrapping in several sheets of paper
- (4) Tying or taping the wrapper in place

- (5) Weighing individually and marking weight on wrapper
- (6) Packing several of the hams in cartons for shipment
- (7) Sealing, marking, and asiding the carton to the shipping conveyor.

These elements, as they are termed by the time study engineer, furnish the basis on which a bonus or incentive rate may be set. Usually, any plant operation which can be broken down into such elemental form can be time studied and rated. After a survey of the methods used and application of work simplification principles, stop-watch studies may be made and time values assigned somewhat in the fashion listed in the upper section of the accompanying table. The approximate standards shown are derived from stop-watch studies and expressed in terms of decimal minutes.

Some plants formulate their job values on the basis of such standards, without further refinements, the assumption being that the time value of an operation is equal to the sum total of its parts. That is, if one man performs each part of the operation in the allowed time, he performs the entire operation in 1.2850 minutes, slightly more than $1\frac{1}{4}$ minutes for each piece, or about 47 hams per hour. Two men would produce 94 hams per hour, three men, 141 units, and so on.

At first glance, this looks like a logical time allowance. However,

with several thousand hams waiting daily for wrapping and packing, it is obviously impractical for one or two men to attempt the job. Even for a much smaller production the physical factors of product and workplace locations, or layout, would tend to prevent one person's accomplishing all elements of the task in the time indicated. Hence, mass production long ago devised the job lineup, a sort of assembly line man-operation arrangement.

For the job referred to, **Lineup A** in the table might be used.

Lineup A provides one man for each part of the operation, each element. But the group leader or supervisor who tries this lineup very soon finds out that the operation has a bottleneck; and he is a long way from producing the 47x7 hams called for in the standard each hour.

For example, most of the steps in the job may move along all right—except for the wrapping and tying. A pile of hams keeps accumulating in front of the wrap man, and an even larger stack at the tying position.

At this point, the time study man sees the balanced lineup as the logical answer. Balancing calls for a slight increase over the sum total standard in our first example. However, over a period of years it has proved its worth where plants use group standards; it gives impetus to the production line, presents equal allowances to

all members of the group, and results in lower unit cost to the company through increased output per hour.

Lineup B (see table) compares the balanced group to the unbalanced group in **Lineup A**.

In **Lineup B**, the slowest operation, tying, has been recognized as a bottleneck. Hence, the time standard and job lineup have been built around it. Using .1500 minutes as a factor which exceeds the short elements (inspect, weigh, pack, etc.) and is divisible into the longest element (tying), 10 men are balanced into the operation to result in a smooth working production team.

Some gang leaders may try to beat the lineup, thinking to save a man here or there and perhaps add to their efficiency record. **Lineup C** shown in the table illustrates such a case.

Since Element No. 4, at .4500 minutes, is still the bottleneck, the C line with 2 men tying would have to use a factor of .2250 minutes for the common unit time, thereby increasing the total time per unit to 2.0250 minutes.

Conversely, a speedup is occasionally tried by increasing the manpower of the lineup, giving the results shown in **Lineup D**.

Compared with **Lineup B**, and using No. 5, the weighing element, as the bottleneck, it is seen that much less time is added by one more (D) man than by one less man (C).

Regardless of how it looks on paper, a balanced lineup, such as

Analysis of Packaging Procedure

1—Removing from Rack	.1200
2—Smell Inspection	.1000
3—Wrapping in Sheets	.2500
4—Tying on Wrapper	.4500
5—Weighing and Marking	.1400
6—Packaging in Cartons	.1250
7—Sealing and Routing	.1000

Time values assigned after stopwatch studies

Procedure	Element Number	Operation	Minutes Per Piece	Number of Men
Lineup A (will not work because of pileup at 3 and 5)	1	Remove	.1200	1
	2	Inspect	.1000	1
	3	Wrap	.2500	1
	4	Tie	.4500	1
	5	Weigh	.1400	1
	6	Pack	.1250	1
	7	Seal	.1000	1
			1.2850	7
Lineup B	1	Remove	.1500	1
	2	Inspect	.1500	1
	3	Wrap	.3000	2
	4	Tie	.4500	3
	5	Weigh	.1500	1
	6	Pack	.1500	1
	7	Seal	.1500	1
			1.5000	10
Lineup C	1	Remove	.2250	1
	2	Inspect	.2250	1
	3	Wrap	.4500	2
	4	Tie	.4500	2
	5	Weigh	.2250	1
	6	Pack	.2250	1
	7	Seal	.2250	1
			2.0250	9
Lineup D	1	Remove	.1400	1
	2	Inspect	.1400	1
	3	Wrap	.2800	2
	4	Tie	.5600	4
	5	Weigh	.1400	1
	6	Pack	.1400	1
	7	Seal	.1400	1
			1.5400	11

B, presents a job standard based on economy for the company (400 hams per hour per gang of 10) and fairness for the worker. In addition, this type of standard

pictures clearly each element of an operation as it relates to the other, an important detail whether labor or management is scrutinizing the time values.

Standard Buildings

(Starts on page 60)

lean-to running the entire length.

4. A metal-covered 60 x 120 ft core room at an eave height of 12 ft.

5. A metal-covered 60 x 100 ft cast iron machine shop at an eave height of 12 ft.

6. A metal-covered 120 x 120 ft cleaning, maintenance and pattern shop at an eave height of 12 ft.

Production at the new plant is now 135,000 lb per eight-hour day, or nearly 70% above the 80,000 lb produced daily in the old foundry.

Hot Water Can Take You For a Ride

(Starts on page 62)

jet propelled.

Manufacturers of relief valves for hot water supply systems have recognized this hazard and they have developed temperature relief to supplement pressure relief, particularly when there is no point in having water temperatures in excess of 180-200 F.

These facts show that if a pressure vessel containing liquids at above the pressure boiling point is not in safe condition as deter-

mined by competent internal inspection there may be an extreme hazard. The smaller vessels, often inaccessible for this thorough inspection, are often thought of as unimportant. Frequently they present the greatest hazard. If service requirements do not demand temperatures above the pressure boiling point of a liquid, limit the temperature automatically and supplement pressure relief with temperature relief.

Boiler Drum Water Level Indication

Boiler Code Committee Case #1155 Outlines New Method

By **JOHN W. WELKER**

Application Engineer
Yarnall-Waring Company

FOR MANY years the basic primary element for indicating high pressure boiler drum water level has been the water gage. The present ASME Power Boiler Code (1952) requires the use of two such gages, as set forth in the following excerpt from paragraph P-291:

"Water Glasses—each boiler shall have at least one water gage glass except that boilers operated at pressures over 400 psi shall be provided with two water gage glasses, which may be connected to a single column, or connected directly to the drum. . . ."

For years, during which gages only could be used as primary elements, many advantages of indicators used as secondary elements became well established. As a result, the reliability and optimum readability of water level indication as offered by panel-board indicators, recently prompted an investigation of the suitability of remote manometric type indicators as substitutes for gages as *primary* indicating elements.

The investigation resulted in favorable recommendation of several such indicators, and the ASME Boiler Code Committee was subsequently requested to consider the substitution. The committee investigated in accord with the request, and reported favorably by extending conditional approval. Committee action has been released as Case #1155 which reads as follows:

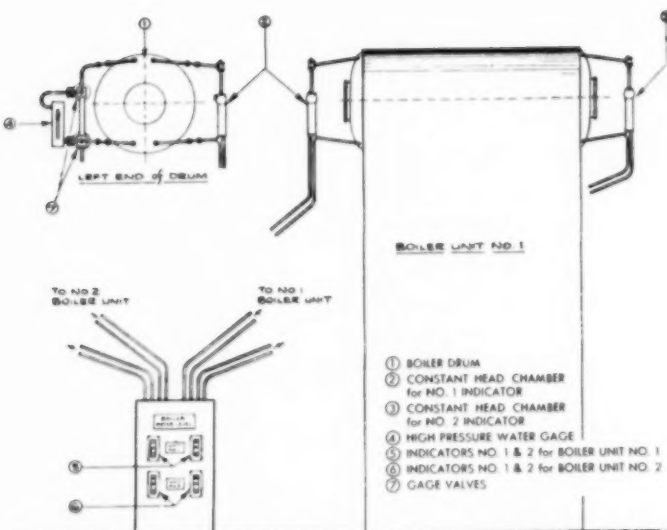


Fig. 1.

Case No. 1155

(interpretation of Par. P-291)

INQUIRY: May compensated manometric remote type level indicators be used in place of the gage glasses specified in Par. P-291 for measuring boiler drum water levels?

REPLY: It is the opinion of the Committee that two independent remote level indicators of the compensated manometric type may be used instead of one of two required gage glasses for boiler drum water level indication in the case of power boilers with all drum safety valves set at or above 900 psi. When both remote indicators are in operation, the gage glass may be shut off but shall be maintained in serviceable condition. The remote indicators shall not depend for operation upon any

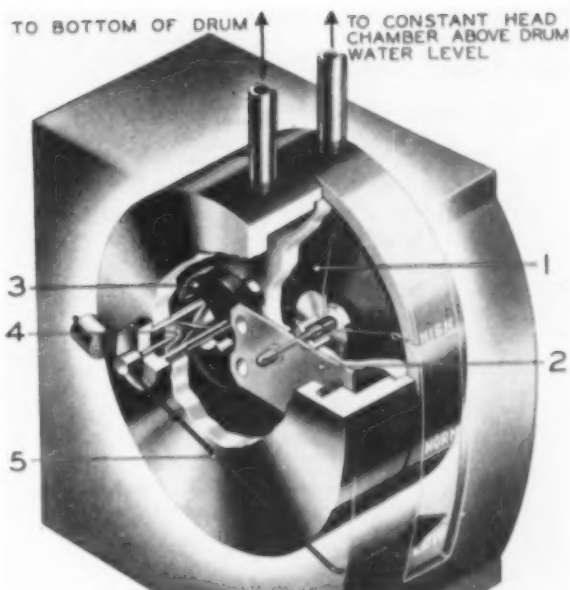
external source of energy. Connections to the drum shall comply with present rules Par. P-293 and P-320 for water columns and shall be completely independent of connections for other functions.

This ruling is permissive but not compulsory. However, it offers the high pressure (over 900 psi) boiler plant operator certain advantages. By bringing the indicating instrument down to convenient eye level it is possible to easily check drum water level, and use of such accessories as mirrors for light transmission systems from hard-to-see gages can be minimized. In addition, such an indicator offers a true double check on drum water level. Under the ruling, it is possible to shut off the water gage with the two indicators operating. This results in reduction in gage maintenance.

Fig. 2. Several makes of instruments meet the specifications. In this design, constant pressure from a constant head chamber located above drum water level is maintained on one side of a diaphragm. A variable pressure changing with water level is maintained on the opposite side of the diaphragm.

Change in differential between the two pressures moves the diaphragm (1), which in turn through a deflection plate (2), a magnet (3), and a spiral magnetic armature (4) regulates the position of the counterbalanced pointer (5)

The instrument, motivated directly by water level changes, meets the requirements of the Code Committee ruling.



One typically recommended installation is shown in Fig. 1. It is preferable that the two indicators be connected to the opposite ends of the drum. However, prior to making an installation, the potential user should check local and State authorities who may not immediately recognize the Boiler Code ruling.

An important requirement is that the instrument must not depend for its operation on any ex-

ternal source of energy such as commonly used with pneumatically operated or electrically-operated indicators. Several makes of instruments meet the specifications, and one such design is shown in Fig. 2. This instrument of the manometric type, is motivated directly by water level changes, and thus meets the requirements of the Code Committee ruling.

Years of acceptable usage of compensated manometric liquid level indicators as secondary or supplementary elements in conjunction with gages assure their success as independent primary elements. The recent ruling broadens the recognition of this type of instrument, and points to a relatively new approach in boiler water level indication.



General Electric Specialty Instrument's Display Coach Now on Nation-Wide Tour

AN EXHIBIT trailer featuring demonstrations and applications of GENERAL ELECTRIC specialty instruments for increased productivity be-

gan a year's tour of the United States on November 2.

According to HUDSON S. DAY, manager of specialty instrument sales for

G-E's Meter and Instrument Department, the "Measurement-mobile" will make more than 250 stops in key industrial areas and will be inspected by more than 15,000 instrument users throughout the nation.

The traveling exhibit will emphasize widening present-day applications of instruments in production testing, process and quality control, laboratory analysis, control and analysis of electric utility systems, and measurement for service and maintenance of equipment. About 40 instruments, ranging from atomic radiation measuring equipment to leak detectors having the "keenest noses in industry," will be available for on-the-spot demonstrations. Specialists familiar with all the displayed products will conduct tours for selected instrument users.

The "Measurement-mobile" is 31 ft long and 8 ft wide. It is drawn by a 1/2-ton carry-all sedan. The exhibit contains its own power supply, heating system, and air-conditioning unit.

**Improving station efficiency
at low loads . .**

Limiting HEAT RATE Increases

PROBLEM: Plant efficiency decreases when plant load factor decreases. Operating as a peaking plant, load factor becomes low, the heat rate increases, and efficiency drops.

SOLUTION: Southwestern Gas and Electric engineers endeavor to locate the sources of the increased heat rate and reduce the losses as much as possible. Auxiliaries, distilled make-up water, and final steam temperature are principal contributors to increased heat rate.

Auxiliaries that can be cut off and not affect plant operation should be studied in each plant; packing gland drains and deaerator vents should be examined; and excess air and burner combinations checked.

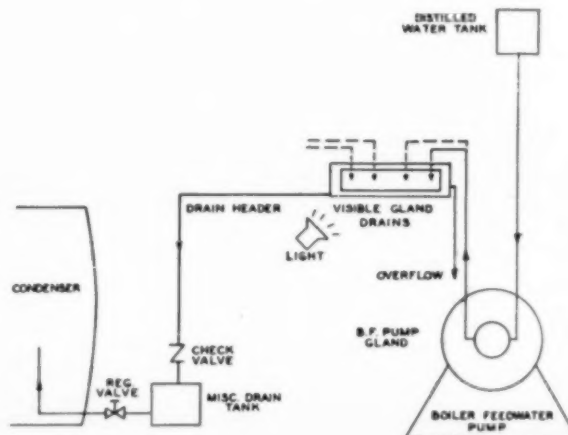
THE rising cost of gas has been playing an increasing role in the economics of the modern high pressure steam power plant. This cost has risen to such an extent that some plants which were built at the very close of the war as base load plants are now considered as peaking plants. This is because short term gas contracts were made in these plants and the price of gas in the new contracts has doubled.

The station heat rate, net Btu per kwh output or plant efficiency is adversely affected by low plant load factor. That is, if the plant is used as a peaking plant, the load factor becomes low, the heat rate increases, and efficiency drops.

FIG. 1. SCHEMATIC DIAGRAM OF BOILER FEEDWATER PUMP GLAND WATER PIPING

Gland water for boiler feedwater pump comes from distilled water tank, down through the gland, and up to the visible gland drain. At this point, the drains from each boiler feedwater pump gland spill into a drain header. An auxiliary light was added to illuminate the visible gland drain so the operator could see that each gland was functioning properly.

Drainage then goes to the miscellaneous drain tank. A check valve was placed in the drain line just ahead of the drain tank to prevent back pressure when the high pressure drains are discharging into the tank. If the check valve closes due to the high pressure drains blowing into the miscellaneous drain tank, the visible drain will fill to the overflow outlet and dump into the waste drain. From the miscellaneous drain tank, gland water flows back to the condenser through a regulating valve.



**By J. T. MOORE
and JOHN O. HAYTER**

Mechanical Engineers
Southwestern Gas and Electric Co.
Shreveport, Louisiana

J. T. MOORE, B. S. Mechanical Engineering, Member ASME, has been associated with the power department of Southwestern Gas and Electric Company for the past 24 years. His duties in the plant operating department include plant performance and instrument engineering.

JOHN O. HAYTER, B. S. Mechanical Engineering, Junior Member ASME, has been associated with the power department of Southwestern Gas and Electric Company since 1950. For the past two years he has been working in the plant operating and plant design department.

A study was made to see if it were possible to locate the sources of the increased heat rate and to reduce them as much as possible. The following represent the greater portion of the increased heat rate:

1. Increase in the percentage of auxiliaries to the total generation.
2. Increase in the percentage of distilled water make-up.
3. Decrease in the steam temperature to the turbine.

Auxiliaries

A check of the records of the modern power plant will reveal that the power necessary to drive the auxil-

iliary equipment is nearly constant for all loads. If the auxiliary load is divided by the total generation and expressed as a percentage, this percentage will increase as the gross generation decreases.

In a modern steam plant operating with a high load factor of 80%, the load for auxiliaries will be approximately 4%. In the same plant, operating with a load factor of 60%, the auxiliary load will be approximately 5%. This percentage increase will be evident in the net heat rate of the plant.

In most plants the auxiliary load is at a minimum and about the only thing that can be done is for the operators to keep a continuous check on the equipment to see that it is operating properly and to make sure that no unnecessary machines are running.

Some thought was given to using steam driven auxiliaries to reduce the auxiliary load and tests were run using the steam driven boiler feedwater pumps. But as will be seen from the following tabulation, instead of an improvement, the heat rate was actually increased by about 570 Btu when the steam driven feedwater pumps were substituted for motor driven pumps.

	Table 1	
Excess Air	25%	35%
Net Station Heat Rate Using Steam Driven Boiler Feed Pumps	12,230 Btu/kwh	12,260 Btu/kwh
Net Station Heat Rate Using Motor Driven Boiler Feed Pumps	11,900 Btu/kwh	11,690 Btu/kwh

Distilled Make-up Water

The present practice in large steam power plants is to produce the necessary make-up water for the boiler by means of an evaporator connected into the closed cycle system. In most plants, the make-up amounts to approximately one per cent of the steam generated.

This problem was attacked by investigating the different sources of loss:

1. Investigation determined that the drains from the packing glands on the boiler feed pumps had approximately 125 lb/hr of distilled water passing through them to waste.

2. The deaerator vent was inspected and it was found that an excess of steam was being expelled along with the non-condensibles.

The first of the above losses (drain from the packing gland) was corrected by trapping the water back to the condenser. One plant accomplished this as shown in Fig. 1.

In another plant, trapping of the gland water was accomplished in much the same manner, except that a vacuum trap was used as a seal between the gland water drain and the condenser.

The deaerator vent loss in one plant was reduced considerably by placing a valve on the vent and regulating the flow. Each time the valve was adjusted, a Winkler test was run on the deaerator to see if any oxygen was present. The valve was closed $\frac{1}{4}$ turn at a time until oxygen showed up in the deaerator and the valve backed off to the previous setting

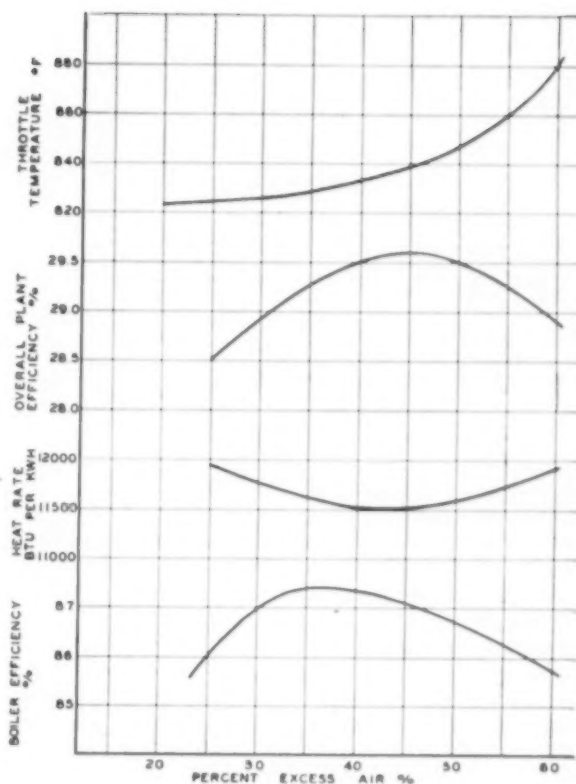


FIG. 2. LOW LOAD TEST WITH VARYING EXCESS AIR

These tests were run on a 225,000 lb/hr boiler operating with a balanced draft system. Note that the station heat rate decreased until the excess air approached 43%; then the heat rate started increasing. It is at this point that the maximum station efficiency is obtained.

After this final position had been reached, there was another check made to make sure there was no oxygen in the boiler feedwater. If the boiler should start requiring more sulfite than usual, the deaerator would not be functioning properly because the vent had been pinched down too much.

Final Steam Temperature

Low final steam temperature is the largest source of loss due to low load operation. Two things were done to see if they would help improve the steam temperature: (a) The excess air was increased to raise the temperature; and (b) different combinations of burners were cut out to see if this made a difference in the temperature.

In one plant the final steam temperature was 830 F at minimum load compared to 900 F at full load. A large amount of excess air was admitted to the boiler to see what would happen. Because of the increased quantities and volume of gases through the furnace, more heat was supplied to the superheater, thereby raising the final steam temperature.

It can readily be seen that when the excess air is increased, the boiler efficiency is decreased; however,

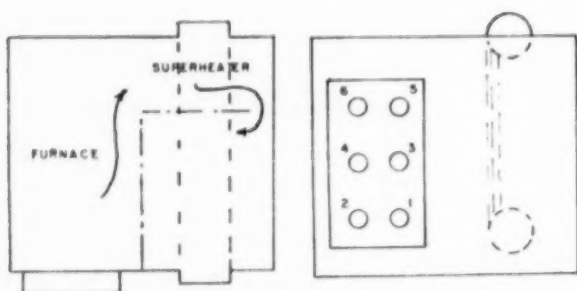


FIG. 3. Sketch of pressurized type furnace. Plan view (left) path of hot gases; front elevation (right) shows burner location.

the extra heat added to the steam will decrease the turbine water rate or increase the turbine efficiency more than it will decrease the boiler efficiency. The amount of excess air should be determined by test on each unit to find the point where the extra heat increases the turbine efficiency more than it decreases the boiler efficiency.

Proof of the foregoing statements can be seen in the series of graphs in Fig. 2, which clearly show how much excess air should be added to achieve the lowest station heat rate. These tests were run on a 225,000 lb/hr boiler operating with a balanced draft system. It can be seen from Fig. 2 that the station heat rate decreased until the excess air approached 43%; then heat rate started increasing. It is at this point that the maximum station efficiency is obtained.

The excess air tests were run in another plant on a 300,000 lb/hr pressurized boiler operating with a forced draft system. The temperature at minimum load with 9.5% excess air was 877 F. By increasing the excess air 18%, the temperature was brought up to 900 F, which is the normal operating temperature.

Table 2 shows the increase in plant efficiency or the decrease in heat rate:

Table 2		
Unit	9.5% Excess Air	18% Excess Air
No. 1	11,830 Btu/kwh, net	11,524 Btu/kwh, net
No. 2	11,448 Btu/kwh, net	11,122 Btu/kwh, net

Tests were also run on these pressurized boilers using different burner combinations. From Table 3, it can be seen that there is a decided improvement in plant efficiency by using burners No. 1, No. 3 and No. 5. (See Fig. 3 for proper location.) It is believed that the heat is carried back to the superheater from these burners more readily than from other combinations of burners.

Table 3	
Unit No. 1 Using 8% Excess Air	
Burner Combination	Net Heat Rate
1, 2 & 3	12,010 Btu/kwh, net
1, 3 & 5	11,830 Btu/kwh, net

In summarizing, several procedures are recommended as possible solutions. The auxiliaries that could be cut off and not affect plant operation should be studied in each plant. The packing gland drains and deaerator vents should definitely be examined. Although selection of correct excess air and burner combinations are only a partial solution to the low temperature problem, they should always be checked.

When these losses have been corrected, much will have been done to improve the station efficiency at low loads.

The authors wish to thank the following employees of Southwestern Gas and Electric Company who made this discussion possible: *R. S. Moncrief*, Supervisor of Power Plants; *W. E. Lowery*, Chief Engineer, Knox Lee Power Plant; *John W. Turk*, Mechanical Engineer; *Fred A. Tait*, Maintenance Foreman, Knox Lee Power Plant; *J. W. Twilley*, Chief Engineer, Lieberman Power Plant; and *G. R. Willingham*, Maintenance Foreman, Lieberman Power Plant.

Super-Critical Pressure Steam

Turbine designers take a look up into the region of 5000 pounds and temperature of 1200 degrees.

TURBINE steam conditions continually edge upwards. Several machines are operating at pressures between 2000 and 2400 pounds. All the largest machines now building are for 1000 or 1050 degrees, and this year the Westinghouse Electric Corporation will have a 1100-degree machine on the line.

With fuel costs showing no disposition to stop rising, the urge to lower heat rates is as strong

as ever. So, what next? Engineers are casting a sharp eye on another increment in steam conditions. Increment, the dickens! A long broad jump—up into region of 5000 pounds and temperatures of 1200 degrees—even well beyond the portion of steam tables where there is experimental proof of accuracy. Actually fundamental research on steam properties at these temperatures and pressures is needed.

One reason for considering such a large increase in steam conditions is that a really big step is necessary to make appreciable gains. There is another reason. At 3206 pounds absolute pressure and at 705 degrees F, water and steam have equal densities. At this condition water is converted directly into steam without boiling. There is no change in volume, no latent heat of vaporization. The same situation also exists at pressures exceeding 3206 pounds, but at temperatures somewhat greater than 705 degrees. For example, a boiler producing steam at a pressure of 3206 pounds or more needs no steam drum. The critical state is one to be avoided, with

(Continued on page 88)

**SP&I presents a special eight page report
INSTRUMENTATION TERMS**



What Do They Mean? Are You Confused?

*INSTRUMENT ENGINEERS are having themselves a time
with a language as baffling to the inexperienced as jargon
of the nerve specialist would be to a garage mechanic.*

EXTRA COPIES: A limited number of reprints of this eight
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SOUTHERN POWER & INDUSTRY
806 Peachtree St., N.E.
Atlanta 5, Georgia

What Do They Mean?---Are You Confused?

THE TASK of causing a high velocity projectile and a fast moving plane to arrive simultaneously at the same point in space, was accomplished by replacing human operators with servomechanisms and perfecting automation.

System engineering for this development involved considering the dynamics of the entire system as contributing to the performance of the whole as a closed-loop system. Communications methods and techniques were adopted that included studies of response to sinusoidal signals (frequency response), as well as to the more familiar step change (transient response).

Since the war, the science of system engineering is invading the field of industrial process control. At the present time, computers (both analogue and digital), are entering the process control picture.

As processing methods grew in complexity, and improved performance was demanded, industrial automation increased and there was a trend toward replacement of individual open-loop control systems (manually set), with multiple closed-loop systems in which feedback and gain and phase shift played significant parts.

This tendency to entrust responsibilities to instruments gave rise to a need for supervisory or monitoring devices. Thus, loggers and scanners became important. It is their job to receive numerous signals from various transducers and warn operators or shut down equipment if any variable deviates beyond preset limits. And, to improve product, processors are becoming increasingly interested in end point control or quality control.

System engineers through optimization have approached the threshold of the completely automatic factory in bulk product operations. But when dealing with discrete units, it is vastly more difficult to work out a system that will provide process equilibrium.

Because of the great number of automatic controllers in highly instrumented plants, miniaturization is becoming more evident, and more and more graphic panels are appearing. In many instances where variables measured at one location need to be recorded at another location miles removed, telemetering gives the answer. Transistors also contribute much to miniaturization, and thermistors promise to be of great value in the field of primary sensing elements.

If you know what the underscored words mean, you won't need to read this article.

INSTRUMENT ENGINEERS are having themselves a time with a language as baffling to the inexperienced as jargon of the nerve specialist would be to a garage mechanic.

WORK with industrial instrumentation during the past several years has made us painfully aware of a continually increasing "rash" of words that sound very impressive but leave us hanging in mid-air as to what they mean. This is particularly true of discussions dealing with automation, and the automatic factory. Our editors have been closely concerned with industrial instrumentation for many years and they make an especial effort to learn all they can about new terms in the industry they serve. So, knowing how we are confused, we can't help but wonder if the average plant or process engineer who tangles with

these terms less intimately is not in a similar predicament.

Let us show you what we mean. The dissertation which heads this article is something that came to us recently. The underscored words made us stop and ponder for a while—and all to no avail.

TAKE A GOOD LOOK AT IT

See what we mean? That's an example of what happens when a new science comes into existence. It spawns an almost entirely new language—a language crammed with words that are either entirely new, and not to be found in any dictionary; or, what is still worse,

words that *are* in the dictionary, but which, when used by the instrument engineer, take on a meaning that has nothing whatsoever in common with the dictionary definition. It happened in electronics; it's happening in nucleonics; and now the same thing is taking place in the realm of industrial process control—the painful metamorphosis from an art or an empirical science to an exact science.

And to make matters still worse, this development in the field of automatic control is taking place at such a terrific pace that the instrument engineers are having to extend themselves to coin words fast enough to keep up with their

progress in devising new equipment and techniques.

The rather confusing result of all this is best expressed by the following, extracted from "The Language of Automatic Control" in the September 1952 issue of *Scientific American*:

"Part of their (the control engineers) specialized vocabulary, to be sure, is openly and obviously technical, and here the reader will realize that he must find out what they are talking about. Some of

their terms, however, will look like ordinary English, and the reader is warned that these everyday words have been made to mean just what the engineers choose them to mean. And where no word can be bent to their purpose, new ones have been invented."

Such being the case, we decided to confer with a few of the individuals who speak this new language and extract from them the down-to-earth meaning of at least a few of these vague, mysterious

terms. The results of our best efforts follow. The list is not complete,* and some points in our definitions may be hotly criticized by experts in the field of automatic control, but at least, we feel that it is a step in the right direction.

*Readers more seriously concerned with standardization, especially those making instrumentation their profession, will want to follow closely the excellent work being done on this subject by the professional societies: American Society of Mechanical Engineers, American Institute of Electrical Engineers, Instrument Society of America, and others.

Q—What is AUTOMATION?

A—The act of rendering the operation of an industrial plant partially or completely **automatic**. It involves special techniques, and equipment such as servomechanisms, regulators, and computers. In general it can be subdivided into:

(1) **Process Automation**: dealing principally with the process variables such as temperature, pressure, flow, liquid level, pH, density, viscosity, etc.

(2) **Mechanical automation**: dealing principally with time, position, and dimension.

EXAMPLE—A device for automatically moving a

piece of work through a given time-cycle in a multiple spindle drill press or milling machine is an example of mechanical automation. Material handling equipment also falls into this category. Automation is extensively employed in the processing industries to automatically conduct materials through various processing steps—and on to a finished product.

Q—What is FEEDBACK?

A—The characteristic of a control system wherein some sensing element such as a thermometer or flow meter senses a change in a controlled variable such as temperature or flow, and sends this measured change back to a controller which compares the measured instantaneous value with the desired value established by the controller setting; and, when necessary, operates a valve, damper, or other final control element to restore the measured variable to the correct value.

EXAMPLE—An excellent example is the thermostat controlling your furnace at home. As the room temperature drops below the value established by the thermostat setting, the thermostat senses the change, determines that more fuel is needed, and **feeds this information back** to the fuel valve which operates to increase the heat input to the room.

Q—What is a CLOSED LOOP?

A—In the instrument engineer's language, a closed-loop or **feedback** control system is a complete system embracing a piece of process equipment and its controls. Components of the control system include: the measuring means, the controlling means, and some final control element such as a valve. Signals pass around this loop, and corrections result from error signals, which are the difference between the desired value and the actual value.

EXAMPLE—Let us assume that water in a tank is heated by an immersed coil and that a thermometer bulb, in the discharge line, is connected to a temperature control instrument which in turn operates a valve supplying steam to the heating coil. If we want the water to leave the tank at 180 F we adjust the control index of the instrument to this value. The instrument compares discharge temperature with the

ACKNOWLEDGMENTS

The idea on which this article is based and the first rough draft of definitions were submitted by E. A. MURPHY of Minneapolis-Honeywell Regulator Co. Then the material, further developed by the editors, was sent to a large number of engineers in the instrumentation field for criticism and improvement.

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While all suggestions proved helpful, not all could be reconciled and included. So the article must be considered primarily as an editorial effort. We know it is not perfect, not complete, and subject to improvement as the science of instrumentation advances. COMMENTS are WELCOME.

What Do They Mean? (Continued)

desired value, as established by the setting of the control index, and regulates the steam valve to maintain desired temperature. There is no human element involved and we have a closed-loop system.

Q—What is meant by OPEN LOOP?

A—The open loop control system is one in which the output is **not** automatically compared with the input—the control is **not** completely automatic.

EXAMPLE—Under the definition of **closed loop** we used an automatic water heater as an example. A thermometer in the discharge sent its findings to a control instrument which automatically regulated steam to hold the water at the desired temperature.

Let us remove the temperature control instrument, and replace it with a simple temperature indicator. Let us also remove the automatic valve in the steam line and replace it with a hand valve. We have now opened the control loop. A human operator must inspect the thermometer dial, decide that the water is too hot or too cold, and make the necessary adjustment.

Q—What is CYBERNETICS?

A—This new field in science attempts to find the common elements in the functioning of automatic machines and the human nervous system, and to develop a theory which will cover the entire field of control and communications both in machines and in living organisms.

EXAMPLE—To a student of cybernetics the act of steering a car is an excellent example of a closed loop system. The object, of course, is to keep the car on the right-hand side of the road (analogous to the desired value of an automatically controlled process variable such as temperature or flow). The eyes serve as measuring elements to detect deviations from the desired position of the car, and the brain acts as a control instrument to evaluate the error and send signals to the arms which in turn move the steering wheel to correct this error.

Q—What do instrument men mean by SIGNAL?

A—Information that is **transmitted** from one point in a measuring control system to another.

EXAMPLE—A thermometer bulb senses the temperature in a vessel and transmits a signal to the control instrument. The instrument compares the measured temperature with the desired temperature, and transmits the difference (**error signal**) to the control unit.

Q—What is a SERVOMECHANISM?

A—The **servomechanism** is a feedback control system in which the controlled variable is **mechanical position**. It is characterized by the presence of a final

control element such as a valve or damper that is actuated by some function of the **difference** between the **desired** response of the system, and the response **actually** obtained. This difference is known as the **error**; and correction is obtained by automatically positioning the control element.

EXAMPLE—The final control element, sometimes referred to as a servo-motor, may take any one of numerous forms. The output or error signal from the controller may be electrical, pneumatic, mechanical, or hydraulic; consequently, the final control element may be an electric motor, an air-operated diaphragm motor valve, a mechanically operated valve or damper, or a hydraulically operated device. Effectiveness of the process control resulting from the use of the **servomechanism** is of course dependent upon each element of the system functioning properly.

Q—What is GAIN?

A—The amplification of an instrument's response to a change. Or, it is a factor expressed numerically or percentage-wise which tells us in what ratio the controller acts with relation to the signals it receives.

EXAMPLE—Let us take a pneumatic control unit which receives an air pressure signal from a transmitter measuring some process variable such as temperature or pressure, and in turn transmits another air pressure, say to a control valve. We will assume that as the measured variable increases in value, the input to and the output from the control unit also increase. If the transmitter impresses 1 psi on the control unit, and the controller in turn impresses 2 psi on the control valve the **gain** is 2. If 1 psi causes 1 psi output, the gain is 1.

Q—What is QUALITY CONTROL?

A—These words mean exactly what they say—**control of quality** of the product. Control may be attained either automatically or by human operators. In fact some system of inspection and rejection is usually also implied.

EXAMPLE—Most industrial processes today rely largely on environmental control, wherein skilled operators set the controllers to maintain proper environment. If quality changes, the operator makes necessary adjustments. But many of his "tools" for providing the necessary conditions are wholly or partially automatic in function.

Q—What is END POINT CONTROL?

A—End point control may also be known as **quality control**. The **quality** of any finished product is the governing factor in determining its salability. For this reason, end point control of product quality is usually of great importance to the manufacturer. Actually, product quality may be controlled either manually or automatically. But to instrument men, end point control usually implies an automatic process in which instruments measuring the properties of the end product actuate controls to make any necessary adjustments of temperature, pressure, etc., in the processing stages.

EXAMPLE—Grain size may be an important quality of finished product. Automatic equipment used to monitor finished product and maintain desired grain size by adjusting processing equipment would provide end point control.

Q—What is OPTIMALIZATION?

A—This word comes from **optimum**, meaning the best. It is impossible to have an industrial plant, or any process in that plant, operating continuously in an absolutely perfect manner. Either human or mechanical limitations inevitably defeat this purpose. Optimization is the process of approaching economically perfect operation, as closely as is economically feasible, by means of analytical rather than cut-and-try methods.

EXAMPLE—Each element of a three part continuous process might have the same average maximum capacity, and yet output when operating in sequence would be somewhat lower, because the lagging of any element would slow the whole production line. The obvious answer would be in-line storage between the three separate elements. The storage would bring production nearer to optimum, or maximum co-ordinated overall output.

Q—What is SYSTEM ENGINEERING?

A—Feedback control system engineering, more often called **system engineering**, takes into consideration all elements in the closed-loop control system. Actually it is a systematic, intelligent approach to a control problem.

EXAMPLE—The system engineer realizes that, in the case of the room thermostat, the readings of the thermostat depend on the warmth of the room, and also the warmth of the room depends on the reading of the thermostat. He must consider the design of the room itself: its heat losses, etc., as well as the capabilities of the heating system. Each is a cause and each an effect of the other. When designing a process control system, the system engineer must consider the behavior of every component of the system, from the processing equipment itself, down to the smallest valve or thermocouple.

Q—What is EQUILIBRIUM?

A—Equilibrium means **balance**. There are two kinds of equilibrium, **static** and **dynamic**. The ordinary balance scale with equal weights on both beams is illustrative of **static equilibrium**. **Dynamic equilibrium**, on the other hand, deals with forces or energy in motion. Briefly, dynamic equilibrium is the condition of over-all balance essential to the successful operation of any continuous process.

EXAMPLE—A strip mill in a steel plant is a good example of dynamic equilibrium. As the steel passes through a series of rollers its thickness is reduced. As long as the relative speeds of the various sets of rollers are correct, the steel passes through and the process is in dynamic equilibrium. However, if the relative speeds of one or more sets of rollers are

changed, without changing those of the remaining rollers, the steel strip will pile up somewhere along the line, and the process, being out of dynamic equilibrium, must be shut down.

Q—What is meant by STEADY-STATE and TRANSIENT-STATE?

A—By **steady-state** is meant that some variable such as speed, temperature, or pressure, is either maintained at a steady value or else varies uniformly as to time. If, on the other hand, a variable changes non-uniformly or erratically it is in a condition of **transient-state**. Transient state generally implies a temporarily abnormal condition.

EXAMPLE—The controller on a variable speed motor might be set to maintain constant speed for a definite normal load. But if abnormal conditions on the driven equipment caused a large increase in load, the motor would slow down—causing a transient-state.

Q—What is a GRAPHIC PANEL?

A—The master control panel whereon is depicted a flow diagram, i.e., the equipment and flow lines of the process being controlled. Indicators and recorders may be mounted either directly in the pictorial flow diagram at the locations where pertinent variables are being indicated, or on a panel beneath the diagram. Or, there may be no instruments on the panel—only valves, push-buttons, or lights.

EXAMPLE—Utilized extensively by the petroleum, chemical, paper and power industries, these panels reduce operator training time, decrease the size of the control room, and eliminate the tendency of an operator to become confused as is sometimes the case where a control panel contains a large number of instruments of almost identical appearance.

Q—What is a MINIATURIZATION?

A—In order to reduce space requirements there is an increasing trend toward the use of small indicating and recording instruments occupying approximately 5 in. by 5 in. of panel space, in place of conventional instruments occupying three or four times as much space. In like manner, other components of control systems are being reduced in size.

EXAMPLE—Modern industrial processes are rapidly growing in vastness and complexity so that the space required for panelboards of conventional recording and controlling instruments is in many cases prohibitive. The use of miniature instruments reduces panelboard size, and allows each operator to follow more elements closely.

Q—What do we mean by DISCRETE UNITS?

A—When a plant produces separate, identifiable, countable items such as bathtubs or automobiles, these items are referred to as discrete units. The term is employed to distinguish individual items from homogeneous products such as orange juice, gasoline, or portland cement.

What Do They Mean? (Continued)

EXAMPLE—Homogeneous materials are associated with the continuous processing industries, and such industries lend themselves readily to conversion to "automatic factories." Discrete units, however, create a more complex problem, where automation of processing equipment becomes more difficult.

Q—What is a **LOGGER**?

A—An instrument of the monitoring type that automatically and continuously checks process conditions at specific locations, and **records** results on a chart. Such instruments are usually equipped to actuate audible and/or visual alarms in the event the allowable maximum is exceeded at one or more points. Although temperature was selected for the following example, loggers can be employed to measure most critical variables.

EXAMPLE—Throughout industry there are numerous locations where temperatures, although not automatically controlled, are critical in that they must not exceed given maximum values. The bearings on turbines, generators, fans, pumps, and other auxiliaries in a large power plant are typical examples. Should the temperature at any one point become excessive, it could cause the entire plant to shut down. Loggers are employed to give advance warning of such trouble.

Q—What is a **SCANNER**?

A—The scanner is like the **logger** (already defined) except that the scanner **does not plot** a graph or log. In fact it takes no action at all until the variable being scanned goes out of bounds. Then it gives an alarm signal.

EXAMPLE—Assume there are ten places in a process where temperatures must not exceed allowable maximums. A scanner could be applied to check each point every three minutes, and sound an alarm if any temperature exceeded its limit.

Q—What is a **COMPUTER**?

A—Basically, a computer is an electrical or mechanical calculator. Operating on impulses in response to a schedule, it is a device capable of absorbing, remembering, and correlating large amounts of data at high speed.

EXAMPLE—Consider a processing unit wherein heat and pressure work upon some raw material in order to turn out a product having some desired viscosity. We install automatic temperature and pressure control instruments on the process. Also, on the output of the processing unit, we install an instrument that indicates product viscosity. A human operator observes the latter instrument, and, when viscosity varies from the desired value, he readjusts the control indices of the temperature and pressure con-

trollers to return product viscosity to the correct level. Here, we have an open-loop control system, because the operator is interposed between desired quality of the end product and the automatic controllers which regulate temperature and pressure.

This could be converted to a closed-loop system by replacing the operator with a computer which would absorb the data supplied by the viscosity measuring instrument, calculate, and apply back to the control indexes of the temperature and pressure controllers the corrections necessary to return product viscosity to the desired value.

The function of the computer in industrial control is to recognize the amount of deviation in product quality and program the correction according to previously known relationships between process variables.

Q—What is an **ANALOGUE COMPUTER**?

A—A computing system or model designed to act in a similar manner to an actual process or physical system, so that readings from the computer will be similar or **analogous** to the actual process being studied. The analogue computer allows us to take a system that occupies a large area and does one job and simulate it with a compact device that does many jobs. It is widely used to save calculating time in working out complex problems. It may solve in 5 minutes a problem that would take a dozen engineers, using slow and tedious hand calculating methods, a week to solve.

EXAMPLE—One analogue computer performs the almost incredible job of duplicating what takes place in an underground oil reservoir. It uses electric current through a network of components so designed that the flow of current acts in the same manner as the flow of oil in the reservoir. Since the electric system acts like the reservoir acts, measurements can be made on the computer, and correlated with what would happen thousands of feet underground.

Although the most versatile analogue computers are electronic, they may be designed to function on pneumatic, thermal, or mechanical principles.

In the field of automatic control, most of the analogue computers in use today are employed in the solution of complex control problems; i.e., they may be set up to represent industrial processes and their automatic controls, and supply accurate information as to just how a process will function under a certain type of control. In time, these computers may possibly move from the laboratory into the industrial plants themselves and become components of process control systems.

Q—What is a **DIGITAL COMPUTER**?

A—The digital computer, like a desk calculating machine, deals in numbers. It differs from the desk machine, however, in that it has a "memory." It can "remember" the result of one calculation, and employ that result in a later calculation.

EXAMPLE—In process control, the digital computer can be used to check the answer to a calcula-

tion. If this answer differs from the one that has been placed in its "memory" the computer acts to make the necessary correction to bring the process back into line. It is an extremely accurate device, and is widely used when dealing with very large numbers or quantities and complex calculations where exact solutions are desirable.

Q—What is SINUSOIDAL?

A—Capable of being portrayed by a sinusoid (see illustration), or a curve such as that drawn to represent the positive and negative oscillations of alternating current.

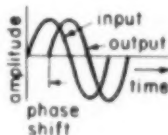
EXAMPLE—In the language of the instrument engineer this term is used to describe the curves he plots based on data developed by deliberately introducing a cyclic variation above and below a given level into a process or control instrument for the purpose of studying the control characteristics of the process or instrument.

Q—What is PHASE SHIFT?

A—Phase shift is a time displacement of the output of a device or system with respect to the input.

EXAMPLE—If a control instrument receives a change in input (caused by a change in the measured variable) at time "0" but does not change its output (signal to final control element) until a second later, there exists a phase shift of 1 second. This is best shown by the accompanying illustration.

This little sketch should be helpful to the reader in understanding the definitions of: SINUSOIDAL, PHASE SHIFT, and FREQUENCY RESPONSE.



Q—What is FREQUENCY RESPONSE?

A—The manner in which a controlled system responds to changes is called frequency response. The usual test method involves deliberately introducing a cyclic sinusoidal variation into the process or control instrument for the purpose of determining the manner in which the output signal varies in phase (see illustration) and amplitude from the input signal as a function of frequency. This information is used in detailed studies of the dynamic behavior of the control system.

EXAMPLE—Let us return to the thermostat for an example. Assume that it is desired to determine the lag between the time the thermostat is reset to a new temperature, and the time the room assumes that temperature. A motor-driven mechanism is arranged to move the thermostat setting above and below a given level sinusoidally, or in a manner much as alternating current varies. These varied settings are plotted against time on graph paper and a sine curve (see illustration) is obtained. During the test period, a recording thermometer in the room continuously records the changing room temperature. From this latter chart, room temperatures are plotted against time on the same graph. We then have an

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input curve (thermostat settings), and an output curve (room temperature).

A series of curves are made by varying the speed of the motor driving the thermostat setting. In this way, the frequency is varied and more curves are obtained. By comparing the curves, it is possible to determine the manner in which the output curve varies in timing or amplitude with the input curve as a function of frequency. This information serves as a basis for determining the manner in which the device or system will react to an input signal.

Q—What is meant by STEP CHANGE?

A—The step change method of making studies, sometimes called the **transient response** method, involves the introduction of a single sustained disturbance or variation, into the input of a controller or component, and a study of the resultant change in controller output as the controller or process "levels out" at the desired value. After the leveling-out has been completed, another **step change** is made, and the results are again studied.

EXAMPLE—This is the usual simple method of "putting a control system through its paces" to see if it performs correctly when specific conditions are altered.

Q—What is TELEMETERING?

A—The process of transmitting a measurement over long distances, usually by electrical means utilizing conductors or radio. The variable, such as flow, temperature, level, or pressure, is measured, and the measured quantities are converted to electrical signals for transmission. A receiving instrument converts these "messages" back into the units of whatever variable is being measured.

EXAMPLE—Telemetry is ideal for the power, pipe line, and utilities industries, where the points of measurement may be many miles from the centralized control rooms. Movement of interchange power at a substation between two utilities may be telemetered to each company.

Q—What is SUPERVISORY CONTROL?

A—Supervisory control functions in the same

What Do They Mean? (Continued)

manner as telemetering to carry information to a distant point, except that it delivers a less complex message. Instead of delivering an actual quantity reading, it merely provides "yes or no" type indication.

EXAMPLE—Messages commonly delivered are: on or off, go or no go, high or low, etc. In the power field, supervisory equipment tells an operator whether a distantly located switch is open or closed. Also the operator can send an impulse over the system to open or close the breaker.

Q—What is a TRANSDUCER?

A—By definition, a **transducer** is a device actuated by power from one system and supplying power to a second system. The instrument engineer's definition is similar with the exception that he might add "—for the purpose of converting one form of energy into another."

EXAMPLE—Strain gages are frequently employed in the measurement of very high pressures. These gages, when acted upon by pressure, produce electrical resistance changes that are proportional to the pressure changes; i.e., they **transduce** the force of pressure into a measurable electrical quantity. Similarly, a thermocouple converts changes in temperature into measurable electrical quantities.

Q—What is a THERMISTOR?

A—The **thermistor** is a type of temperature sensing element. Its principal element is a semi-conductor of electricity, and, unlike conventional electrical conductors, its electrical resistance **decreases** with an **increase** in temperature. A thermistor is a transducer for changing a temperature signal into an electrical signal.

EXAMPLE—Since it transmits an exceptionally strong signal when a very small temperature change occurs, the **thermistor** is particularly suitable for use when narrow temperature spans are to be measured or controlled.

Q—What is a TRANSISTOR?

A—Mechanically simple, this device is comprised principally of a semi-conductor such as germanium and is capable of performing many functions that until recently were almost exclusively executed by vacuum tubes, such as current, voltage, and power amplification. **Advantages:** extremely small; light in weight; practically unbreakable; long lived (no deterioration apparent in four years); highly efficient. **Present limitations:** slightly more expensive; so far, proved only for small power applications; difficult to combine with older components; temperature sensitive.

EXAMPLE—Thus far the available civilian supply has been used principally where light weight and small size are important: hearing aids, portable radios, walkie-talkies, etc. But the inherent merit and rugged nature of transistors will take them extensively into industry as supply increases and price decreases, and as circuits and allied components become available.

Q—What is ULTRASONICS?

A—This new term is used to describe the range of vibration frequencies above the audible range (roughly 10,000 cps and up). The upper limit is not yet clear. Vibrations in this range cause unusual and helpful phenomena.

EXAMPLE—The manner in which ultrasonic vibrations travel through a solid and are reflected from discontinuities permits testing for internal flaws or irregularities. Also ultrasonics is involved in a new process for cutting extremely hard materials.

NOW CHECK YOURSELF—Reread the following (it is a duplication of the introductory paragraphs of this article). Has the haze lifted a trifle? Your comments will be appreciated.

THE TASK of causing a high velocity projectile and a fast moving plane to arrive simultaneously at the same point in space, was accomplished by replacing human operators with servomechanisms and perfecting automation.

System engineering for this development involved considering the dynamics of the entire system as contributing to the performance of the whole as a closed-loop system. Communications methods and techniques were adopted that included studies of response to sinusoidal signals (frequency response), as well as to the more familiar step change (transient response).

Since the war, the science of system engineering is invading the field of industrial process control. At the present time, computers (both analogue and digital), are entering the process control picture.

As processing methods grew in complexity, and improved performance was demanded, industrial automation increased and there was a trend toward replacement of individual open-loop control systems (manually set), with multiple closed-loop systems in which feedback and gain and phase shift played significant parts.

This tendency to entrust responsibilities to instruments gave rise to a need for supervisory or monitoring devices. Thus, loggers and scanners became important. It is their job to receive numerous signals from various transducers and warn operators or shut down equipment if any variable deviates beyond preset limits. And, to improve product, processors are becoming increasingly interested in end point control or quality control.

System engineers through optimization have approached the threshold of the completely automatic factory in bulk product operations. But when dealing with discrete units, it is vastly more difficult to work out a system that will provide process equilibrium.

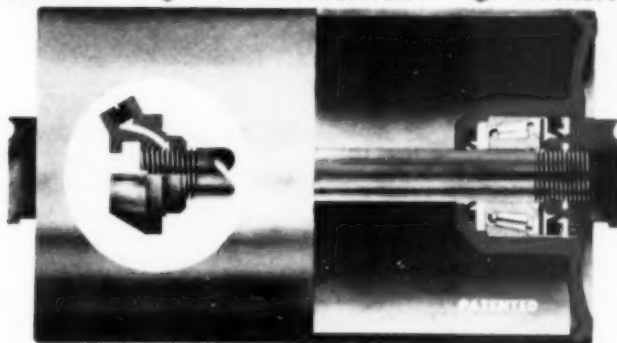
You Need..

CONTINENTAL'S

UST

Idlers

 UNIT-SEALED  PRE-LUBRICATED  TIMKEN BEARINGS



Saves Grease!
Saves Labor!
Saves Belts!
Long Life-

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Kloxures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler for extended periods of time without relubrication for 1-2-3 years or longer depending upon the severity or character of conditions.

For detailed information on these idlers write for Bulletin S.I.-116

THE ULTIMATE IN MINIMUM MAINTENANCE

CG-5210



INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY
 BIRMINGHAM, ALABAMA

ENGINEERS



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MANUFACTURERS

How to Attract and Hold Engineering Talent

THE AVERAGE YOUNG ENGINEER of 1954 is not looking for glamour. He wants security: security both for today and for the years to come. He wants, above all else, to retain his professional standing, but he is more interested in a continuing and adequate pay check than he is in braving the pitfalls of the jungle or arctic frosts. He would rather plug along at a less romantic job with good chances of advancement than fight mosquitos to build a Panama Canal.

HIS ASPIRATIONS are just about those of most other young men who have lived through the insecurity of a major depression, followed by a world upheaval the end of which is not yet in sight.

THE ATTITUDE of the 1954 engineer is brought into sharp focus by the report on a nationwide survey just published in Washington by the Professional Engineers Conference Board for Industry, in cooperation with the National Society of Professional Engineers.

The report, entitled "How to Attract and Hold Engineering Talent," is the result of a survey in which 200 industrial employers of engineers and 1,400 engineers employed in industry participated . . . a survey designed to provide management with a blueprint on how to create a climate in which engineers can work happily and effectively in an employee capacity.

Because the engineers were permitted to answer the questionnaires anonymously, the survey, the third of a series intended to aid industry to better utilize its engineering manpower, brought to light many prevalent and basic faults in engineer-management relationships. But by bringing them to light, it pointed the way toward eventual lubrication of the friction points which have been holding the engineer back from the achievement of his full effectiveness in industry.

It showed, for one thing, that the engineer isn't very different from his non-professional brother in industry when it comes to his desire for an adequate pay check and a reasonable expectation that the numbers on that check will be re-

vised upward at pleasantly frequent intervals throughout his working life.

Sources of Dissatisfaction

The report showed that 45% of the engineers in industry are not satisfied today with the size of those pay checks; that 34% of them do not feel that their prospects for advancement are good; that more than half of them do not know whether their employers are satisfied with their work, and that 38% of them feel that their companies are not making effective use of their training and ability.

It showed, too, that approximately 40% of all the engineers in industry are discontented with two or more important aspects of their jobs, a serious matter at a time when industry is clamoring for more and yet more engineers to fill jobs created by today's tremendous industrial expansion and by the ever-increasing technological complexity of manufacturing processes.

Although the report shows that the labor turnover among engineers in most industrial concerns is lower

than the average for all employees, and although a majority of the engineers themselves indicated a typical reluctance to change jobs except under what they considered extreme provocation, the widespread discontent among so large a group of professional employees, coupled with a strong indication of a growing trend toward unionization, pointed to a danger which the professional cannot well ignore.

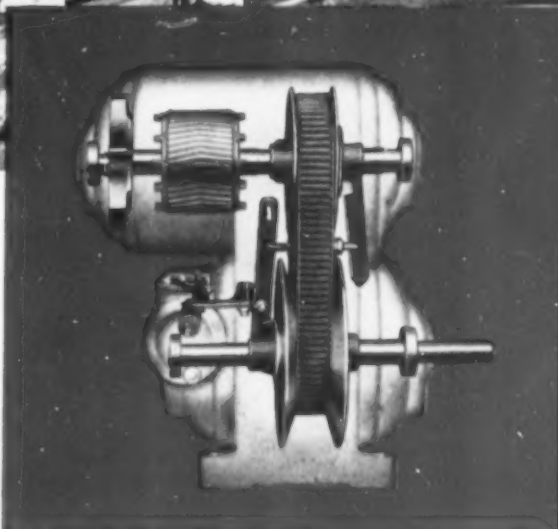
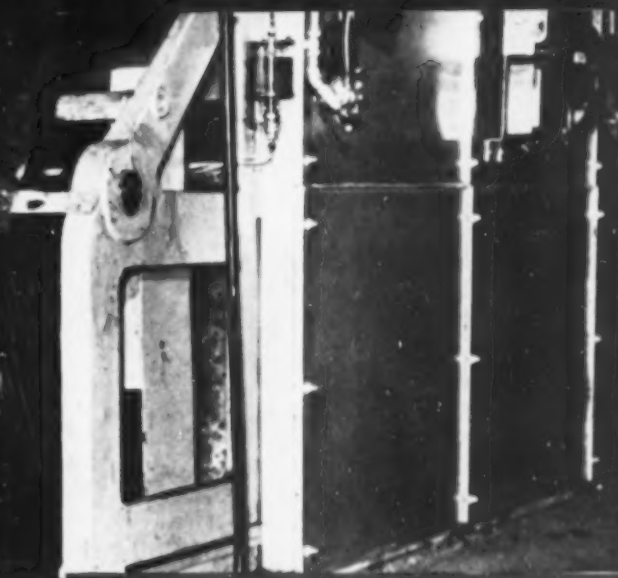
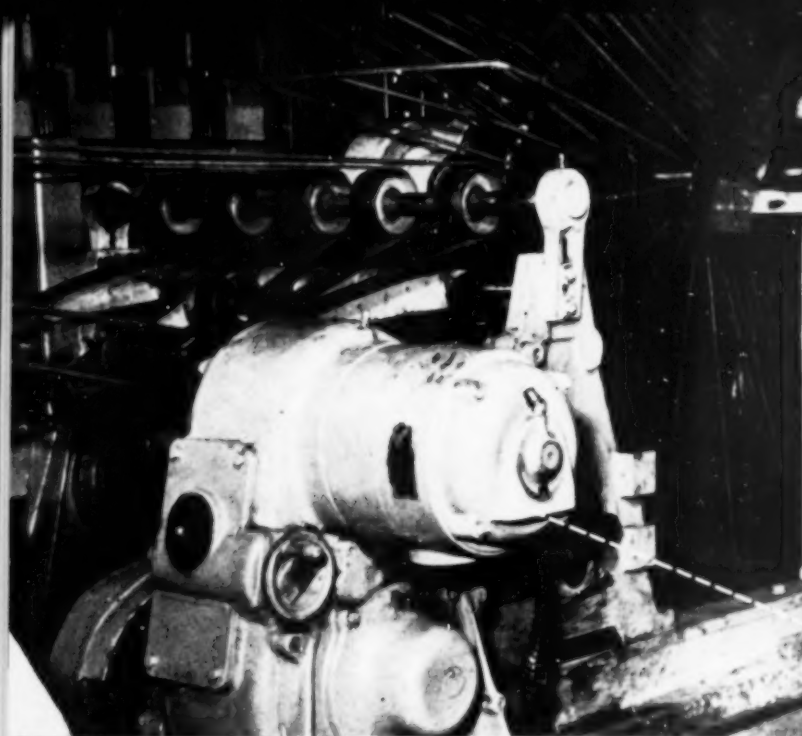
Of the 1,400 engineers who responded to the questionnaire, 34% said they felt that they would benefit by membership in a collective bargaining organization—a significant increase since a similar survey was made five years ago, when the comparable figure was a mere 5%.

And an even greater number (66%) said they believed their interests would be strengthened by membership in a non-bargaining organization, although many of the respondents pointed out that such an organization frequently is the first step toward outright unionization.

The results of the survey gave clear warning to industry and to the professional societies that steps must be taken, and taken quickly, if the engineer's hard-won public recognition as a professional is to be maintained, and, indeed, if the profession is to be saved from a descent to mediocrity and eventual classification as a trade.

The report, however, not only

The Executive Research Survey report, "How to Attract and Hold Engineering Talent," is available from the Professional Engineers Conference Board for Industry, 1121 Fifteenth Street, N. W., Washington 5, D. C., at \$2.00 per copy to non-members and \$1.00 per copy to members of the Society.



NO MAINTENANCE COSTS REPORTED IN 5 YEARS ON

The Speed-Trol on a 90-foot Wagner Lithograph Drying Oven provides the infinite speed adjustment and positive control of speed required for accurate regulation of drying time. This drive, in operation 16 hours per day, five days per week, since 1947, has given trouble-free service, and a recent inspection discloses no worn parts, reports E. E. Roney, Plant Manager, Bond Crown & Cork Co., New Orleans.

Speed-Trol...Variable Speed at its Best

OUTSTANDING FEATURES:

A Single, Compact Power Unit containing motor, variable speed transmission, with or without integral speed reducer—**Effective Cooling Systems** with direct-through ventilation, dual or internal cooling—**Positive Pulley Adjustment** for infinite speed variation, accurate speed selection and regulation—**Fingertip Control of Speed** with standard or remote controls—**Specially Designed V-Belt** for heavy duty, long life—**Protected Designs**, drip-proof, splash-proof,

totally enclosed—**Rugged Construction** for continuous duty, permanent bearing alignment—**Streamlined** for easy cleaning, better appearance—**Interchangeable Mounting Dimensions** between constant and variable speed drives—**Versatile Mounting** for any position—**Smooth, Quiet Operation** through dynamic balancing; Herringbone Rotor; pre-lubricated, double shielded ball bearings—**Low Installation Cost** due to compact design, versatile mounting, interchangeable mounting dimensions.



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emphasizes the problem, but also points to some possible solutions; to methods of achieving a greater harmony and community of purpose between the engineer and his employer, and of strengthening the former's attitudes of professionalism.

The questionnaires probed even into the engineers' educational backgrounds, and it was there that a starting point was found.

The survey showed that 62% of the employer group felt that their engineer employees were inadequately prepared in college to meet the tasks which lay ahead of them in industry, and to this, 28% of the engineers themselves agreed.

A cross-analysis of many of the thirty-six questions to which they were asked to respond showed that from this group came a very large percentage of the unhappy engineers—those who weren't quite sure how the boss felt about their work, who didn't think their prospects with the company were too rosy, and who in many ways exhibited a feeling of inadequacy.

It was made quite clear that something should be done, and quickly, about the curriculums of many of our engineering schools . . . that engineers should be required to carry more English, and social studies and the "humanities" . . . that, in short, those schools which have narrowed their curriculums to exclude, or dismiss with a modicum of attention, nearly everything, apart from purely vocational work, had better start turning out not merely engineers, but *educated* engineers.

Other needs which were indicated in the report are:

1. Readjustment of salary scales to provide more equitable compensation for the engineer who has been in industry for a number of years and who now finds that the pay raises aren't coming as fast as might have been indicated by the fat starting salaries.
2. A new approach to campus recruiting, with a more realistic presentation of the industrial facts of life to the job candidate, who today frequently is "oversold" on the job and soon loses interest because it doesn't come up to expectations.
3. Differentiation in personnel

policies as they apply to engineers and to non-professional employees. (Sixty per cent of the employers said they treated all employees the same.)

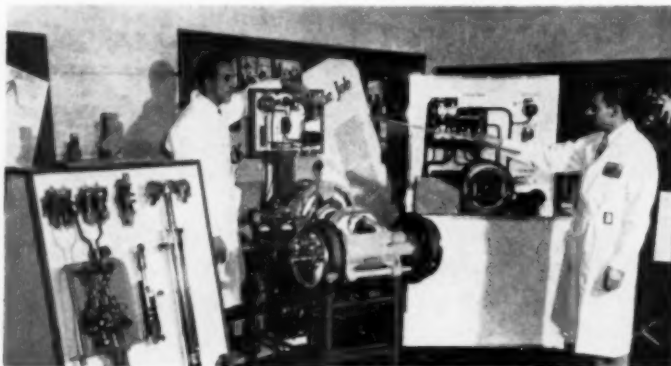
4. Encouragement by management of engineer participation in such prestige activities as writing and lecturing on technical subjects and participation in professional society and community affairs.

5. Improvement of engineer-management communications, both upward and downward, as recommended in Executive Research Survey Number One: "How to

Improve Engineering-Management Communications."

6. Increased employment of supporting, sub-professional personnel for routine assignments to relieve engineers for purely engineering work, as recommended in Executive Research Survey Number Two: "How to Improve Utilization of Engineering Manpower."

7. Increased activity on the part of the professional societies toward the stimulation of professional attitudes not only among their own membership but among all engineers.



Clark's Mobile Service School. Instructor (right) and his assistant are demonstrating a preventive maintenance procedure for the Dynatork Drive. Board at the left is for hydraulic system demonstration and board at the upper right for work on electrical systems.

Preventive Maintenance Mobile Service School

AS AN extension of its factory training program for customer personnel on the maintenance and operation of fork trucks, towing tractors, Ross straddle carriers and related materials handling equipment, the Service Division of CLARK EQUIPMENT COMPANY in cooperation with the dealer organization has organized a Mobile Service School to offer advanced training in the customer's "back yard."

Only employees already familiar with general automotive maintenance and repair techniques are eligible for the course. The subject matter concentrates on recent developments in materials handling equipment, such as the maintenance and operation of electric control systems and power drives developed recently by Clark—the Dynatork and the Hydratork. Operation and maintenance of the hydraulic system on the Clark and Ross line of fork trucks and towing tractors, operation and maintenance of the Ross Carrier, and operation

and maintenance of the Powrworker hand-stacker are also covered.

The Service School is currently touring the country and holding sessions for the industrial community in each dealer's area, special emphasis is placed on training mechanics and service personnel to think in terms of "preventive maintenance." School equipment, transported in a special over-the-road tractor-trailer unit accompanied by the instructor and an assistant, includes working cutaway models of assemblies, movies, slides, printed study material and a public address system. Two sessions are held each day, one in the afternoon and one in the evening, to suit the convenience of employer and employee.

Previously, training of this type was offered only at Clark's Service Division headquarters in Jackson, Mich. There, the permanent Service School offers a comprehensive three-week basic course to personnel from dealer and customer organizations all over the country.



IT FLOATS

ON THE LOAD! *

You turn on the steam.

This little stainless steel valve—the only moving part in the Yarway Impulse Steam Trap installed on the equipment—opens wide and stays open as the air and condensate continuously pour through.

The equipment reaches production temperature in the quickest possible time.

Production temperature reached, the little valve snaps shut. After that, by a pulsating action, it discharges all condensate as it forms—even a tiny teaspoonful. *There's hot steam in the equipment all the time . . . steady, maximum temperatures are maintained.*

It all adds up—to more production per day.

Other profit-making features of the Yarway Impulse Steam Trap—low initial cost, easy installation, stainless steel construction, low maintenance, good for all pressures, quick delivery from over 200 local industrial distributors.

Try a Yarway—free for 60 days—and *prove* its advantage. Your distributor will supply you.

For free Yarway Impulse Steam Trap Bulletin T-1740, write . . .

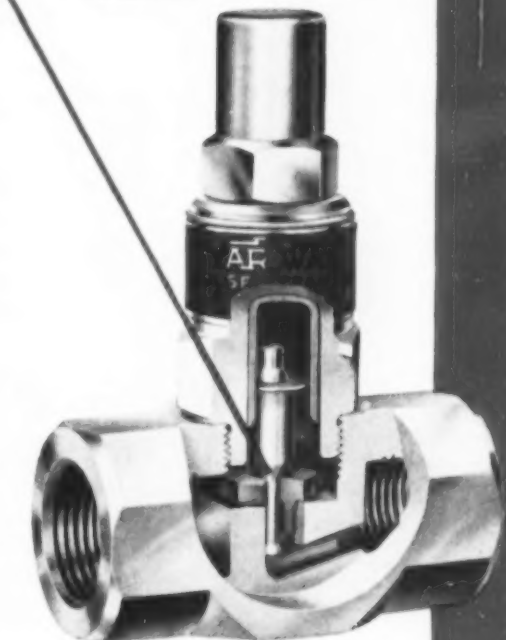
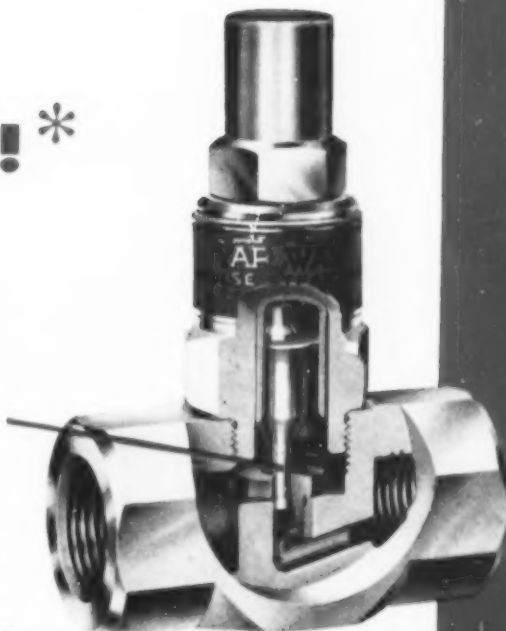
YARNALL-WARING COMPANY

Home Office: 116 Mermoid Ave., Philadelphia 18, Pa.

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* . . . resulting in fast heat-up of equipment, more production per day.



YARWAY / impulse steam trap

Packing-for-Shipment

**International Harvester Company
Memphis, Tennessee**

Plant cuts costs by dismantling cotton pickers and packing in wirebound crates.



ABOUT two-thirds of the mechanical cotton pickers manufactured by International Harvester in Memphis are shipped knocked-down with the parts packed in seven different wirebound crates. Tractors are shipped on flat cars.

MECCHANICAL cotton pickers present many tough packing-for-shipment problems because of their considerable size and weight.

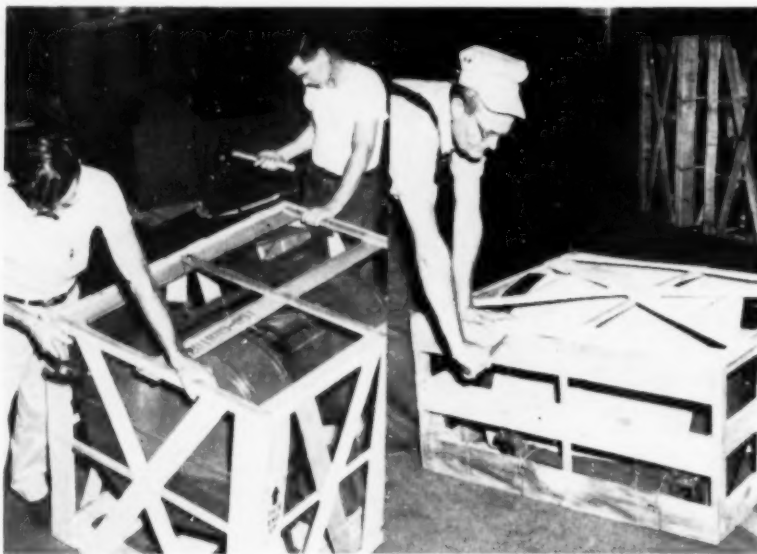
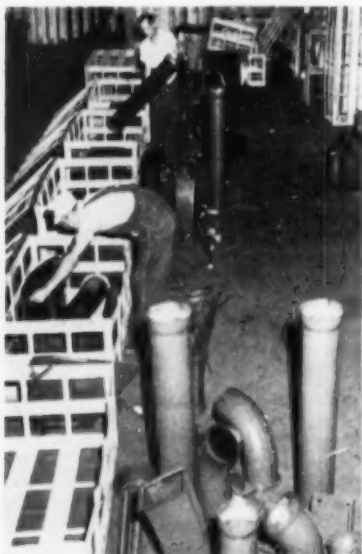
Simply by changing its packing-for-shipment methods, the Memphis Works, International Harvester Company, has obtained over-all packing savings of \$20,300 in one year alone by cutting original ship-

ping container cost \$1288 and container assembly \$3441 per 100 pickers!

Simultaneously, the change effected a reduction of 190 lb per picker in shipping container weight, or nine and one half tons per 100 machines, with consequent freight savings to dealers and buyers.

Three sizes of mechanical cotton pickers are made at the Memphis Works, ranging in gross weights from 7000 to 9700 lb. About one-third are assembled and shipped three to a flat car. The other two-thirds are shipped knocked-down and with the parts packed in seven different shipping containers. For-

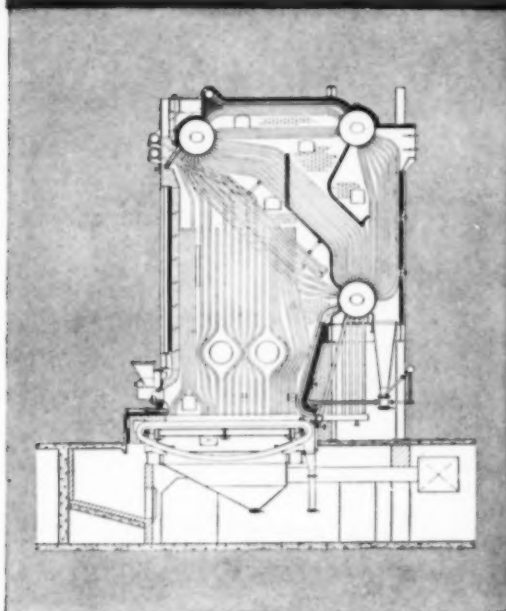
(Continued on page 88)



ORDERLY ASSEMBLING of parts before packing help explain high efficiency of the packing department of International Harvester's Memphis Works. Conveyor pipes are being packed at the left and the dual fan and main drive housing in the center view. Latter are bolted to wirebound crate base, cartoned accessories placed in fan outline and all loose parts tied with wire. Note at

the right that insulating material has been placed as a shield against marring the picker's wheel guard finish. BY ADOPTING the wirebound crates, shipping container costs have been reduced as much as 67% (for radius rod shield), tare weight as much as 68% (for conveyor pipe), and number of units packed per hour have increased as much as 250% (drive wheel shields).

*10,000 People are proud
of their UTILITY*



BOILER DATA

2—E.C. 3-drum—80,000 lbs./hr.—750°F (TT)—399 lbs. O.P.—425 lbs. D.P.—water cooled side and rear walls—Erie City "Travagrate" Spreader Stoker with 12,000 B.t.u. Illinois coal and gas firing.

**CITY OF FAIRMONT,
MINNESOTA**



An Outstanding Record of Performance

1930—All Rates Reduced
1931—Power Rates Reduced
1932—Commercial Rates Reduced (Lights)
1933—Water Rates Reduced
1934—All Rates Reduced
1936—Power and Resident Light Rates Reduced
1940—Commercial Light and Power Rates Reduced
1943—All Electric and Steam Heat Rates Reduced
1945—All Electric Rates Reduced
1949—Increased costs forced 10% increase in all rates

The City of Fairmont, Minnesota, population 10,000, operates its own light, power, water and low pressure commercial steam heating services. The power plant, rebuilt in 1920, houses one 40,000 and one 60,000 pound boiler and two 80,000 pound per hour Erie City 3-drum steam generators added in the past five years. Its kwh generated has increased from 1.8 to 34.6 million in 1951.

The late G. E. Basom, had devoted 28 years to the careful management of this utility. Its outstanding record of rate reduction over the years is a monument to his devotion to the public trust. It is also a matter of great pride to this community that not one cent of taxes was required for financing their utility.

We are proud to have Erie City "Travagrate" Spreader fired Erie City 3-drum steam generators serving the City of Fairmont.

You can depend on Erie City for sound engineering



ERIE CITY IRON WORKS • Erie, Pa.

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS

UNDERFEED AND SPREADER STOKERS • PULVERIZERS

**Why have the equipment if it's
not instantly available . .**

SAFETY EQUIPMENT . . In The Right Spot

By LEON J. BAKER, Safety Director, Higgins, Inc., New Orleans, La.

WHAT is the use of thousands of dollars worth of safety equipment, if it is not almost instantly available for rescue work, fire-fighting or first aid? Placing protective and safety material near supposedly hazardous spots is no longer found adequate. Who knows where an emergency might occur? When a life is at stake, precious minutes may be lost getting the right pieces of equipment to the scene because it was kept in the wrong spot.

At the Higgins, Inc., plant and shipyard in New Orleans, Louisiana, an Emergency Unit, which is an innovation in industrial safety equipment, has been developed. In the extensiveness of its equipment and its speedy availability, this unit far exceeds those of many municipalities, hospitals and other industrial plants.

From The Scrap Pile

An old bus which was used to transport workers to the plant during World War II has been converted into an efficient and speedy means of transporting and handling safety, rescue, first aid and fire equipment. Its seats were torn out. Then, every available inch of space was used to build bins, racks and shelves—each made to hold its own particular piece of equipment and labeled so that no time is lost in finding needed articles. The company's entire variety of emergency equipment is at hand with the arrival of this truck! And that includes 472 pieces.



FILLED WITH 472 pieces of fire-fighting, first aid and rescue apparatus, this Emergency Unit, developed by Higgins, Inc., for use in its 38 acre plant and shipyard is prepared for any disaster. Once an old bus, the vehicle was salvaged from a scrap pile and transformed into this mobile safety station.

First Aid	Rescue	Fire
Complete kit	Chemox breathing apparatus	300 gpm portable fire pump
Supplies	Shallow water diving outfit	300 ft 2½" hose
Stretchers	Asbestos suits	450 ft 1½" hose
First aid kit	Complete burning outfit with oxygen and acetylene tanks	24 five gallon cans Airfoam
Inhalator	Asbestos blankets	Full complement of nozzles
4 extra small oxygen tanks	Smoke or fume ejector with 45 ft of accordion tubing	adapters, wrenches, etc.
1 large oxygen tank	Wrenches, tools, jacks, bars, shovels, pike poles, etc.	3 CO ₂ extinguishers
Splints	2400 watt electric generator	6 2½ gallon Foamite Ex.
Rubber Sheets	All service masks	5 Carbon tetrachloride Ex.
Wool Blankets	Ropes	2 30# dry chemicals
Towels		40 ft. 3 section aluminum ladder
		14' aluminum roof ladder

The truck responds to all fire alarms and all ambulance calls, unless the injury reported indicates it is not needed. At times the unit responds to emergency calls outside of the company property. It is also available to the city fire and police departments and is a part of the New Orleans Civilian Defense Program.

Three teams of seven men each have been trained to man the Emergency Unit—two teams on the first shift and one on the sec-

ond shift. Each team includes four firemen, an electrician, a burner and a first aid man. All work in the area near the plant's safety headquarters where the unit is kept.

During eight months of service, the unit has proved its value many times. The use of the Chemox Breathing apparatus has permitted safety firemen to penetrate smoke areas quickly to reach the seat of the fire. It is a self-con-

(Continued on page 88)

**You Get Time-Tested
Dependability With**



NAVCO *Counterpoise*^{*}

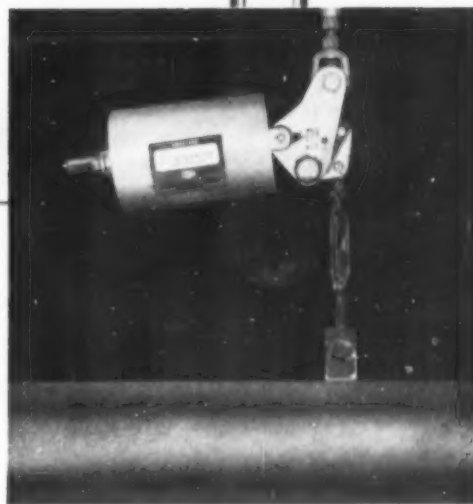
Pipe Hangers

The constant load-carrying capacity of Navco Counterpoise^{*} Pipe Hangers has been proven during an extended period of satisfactory service as the first accurate and efficient support for high temperature piping systems. They are being used extensively in steam generating stations, refineries and chemical plants.

The Counterpoise Hanger is a spring-actuated counterbalance. An ingenious system of linkage transforms the varying force of the spring in an accurate mathematical ratio to produce a load supporting effort of constant value throughout the entire range of expansion travel.

The design permits great flexibility of installation and saves valuable space in congested areas. All parts are ruggedly made and have a high safety factor, yet excess weight and oversize physical dimensions have been avoided to hold space and structural load requirements to a minimum.

The Navco Counterpoise Hanger is available in 16 different frame sizes with load capacities ranging from 200 to 16,000 pounds and expansion travels up to 12 inches. For detailed information on how you can get dependable support with this unique hanger, write today for our 12-page illustrated bulletin #153.



Note above how the flexible top connection permits the hanger assembly to fall in line with the direction of the load pull, so that horizontal travel of the piping has no appreciable effect on the hanger operation. The unit may be positioned at any angle. This affords flexibility in installations where close clearances are a factor.

^{*} Counterpoise is a trade name of the
National Valve & Manufacturing Company



NATIONAL VALVE & MANUFACTURING COMPANY

3106 LIBERTY AVENUE, PITTSBURGH 1, PENNSYLVANIA

New York • Chicago • Cleveland • Boston • Atlanta • Buffalo • Cincinnati

Super-Critical Pressure Steam

(Starts on page 70)

considerable margin, for an operating condition, just as the speed of sound is not a desirable operating point for an aircraft.

A careful study is being made of a 200,000-kw, 5000-pound turbine, with 1200 degrees initial temperature and two reheats. Early calculations indicate that by comparison with a machine of that rating but operating at 2000 pounds, and 1100 degrees, reheat to 1050 degrees, a gain in overall plant efficiency of five to six percent is anticipated.

Offhand the small gain in efficiency might not seem to justify the difficulty and cost of construction that such a high pressure and temperature entails. However, when a few numbers are looked at the complexion changes. Even a highly efficient 200-megawatt

base-load plant consumes about 500,000 tons of coal per year. With fuel prices existing in some industrial areas of the United States, a company can afford to invest about a third of a million more in a 200-mw plant to gain one percent in efficiency!

Feed Pump Problem

All this is in the early—but serious—planning stage. It is apparent that one big problem is the power consumed by the boiler feed pump. As boiler pressure rises the energy required to inject water into it rises at a sharp rate. For example, to service a 200-mw, 5000-pound boiler by a conventional type of pump drive would require about 14,000-hp—or seven percent of the unit output. This, however, is but one of the problems involved. Conspicuous among them will be an integrated boiler-and turbine-control system. Any such plant as a whole must, of course, meet the test of operational dependability and economic justification.

Safety Equipment in Right Spot

(Starts on page 86)

tained unit that generates its own oxygen. The Shallow Water Diving outfit has saved hundreds of dollars in time by being immediately available for inspection and repair of our mobile dock.

Having resuscitating equipment

available has helped save more than one person who needed oxygen immediately, as well as those suffering shock from injury. Recently, an employee was knocked unconscious by lightning, and he owes his life to the quick use of the Pneolator, which administers artificial respiration automatically. During a recent tornado disaster, our unit was among the first to arrive on the scene, a residential area $2\frac{1}{2}$ miles from the plant, bringing an electrician, a burner, firemen and first-aiders to the assistance of those stricken. We know the unit has paid for itself.

This mobile safety unit has been viewed by insurance representatives, fire chiefs, Army and

EVERYTHING that might be needed in an emergency is neatly stored and labeled in compartments of the unit. Company already had most of this equipment but it was scattered in various locations on the plant property.

Navy personnel, Civil Defense executives and Labor leaders. All were enthusiastic in their praise of the amount and type of equipment and the procedure developed to handle it.

One of the safety experts who examined the truck and its equipment remarked that the company must have invested at least \$35,000 in such a unit. The fact is that most of the equipment was already available in scattered locations throughout the plant and the only cash outlay was \$1,344 for some new apparatus.

Packing for Shipment

(Starts on page 84)

merly, crates and boxes assembled and nailed together from shook at the Memphis Works were used.

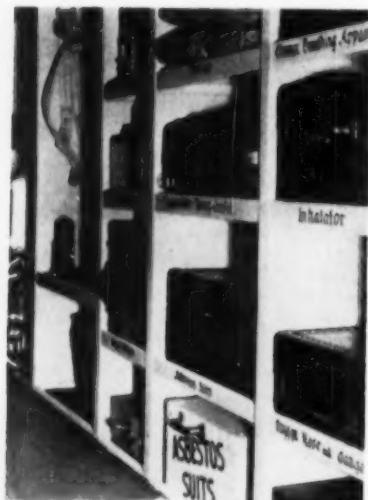
The savings mentioned have resulted since the Memphis Works converted over a year ago to the use of wirebound crates engineered and prefabricated for six of the seven parts—the platform, basket cover, conveyor pipe, fan and main drive housing, radius rod shield, and drive wheel shield. This division of parts into seven packages results in each package being easy to handle and in more economical container costs, man-time, and materials handling.

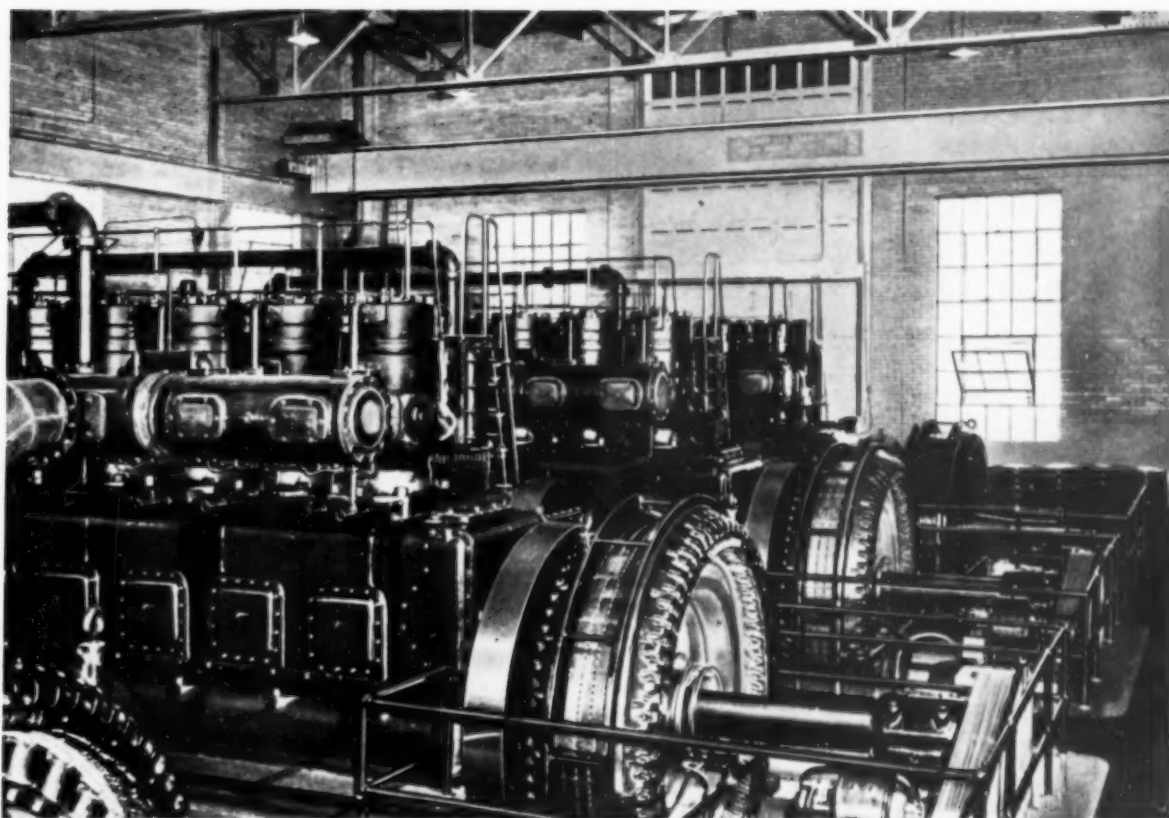
Less easily computed, but also important, are the appreciable savings that accrue from easier and quicker materials handling and more profitable use of floor space formerly devoted to storing and assembling shook.

The wirebound crates are received completely prefabricated with the one-piece wirebound "mats" flat, bundled, and steel-strapped so that they are easily handled in volume by industrial power trucks. Ends of containers are bundled and stacked separately.

Wirebound crates packed with cotton picker parts and ready for warehousing or shipment are placed on pallets and stacked. When shipped, six complete sets of seven crates constitute a carload.

The tractors that provide the motive power for the pickers are shipped on flat cars.





"We're Proud of This Plant!"

says Don H. Decker,— Plant Supt., Thumb Electric Cooperative, Ubyly, Mich.

Manager Orville Hurford and Mr. Decker are justifiably proud of their 4-diesel engine generating station. The plant has been an outstanding financial success since the day it was first opened. Several times it has occupied #1 position on the REA Running Plant capacity chart.

Mr. Decker writes, "A large part of our operating success we attribute to Sinclair GASCON® D oil. It has given us an excellent rate of consumption while reducing wear. In fact, *cylinder and piston ring wear is much below normal based on other plants of equal capacity.* Something else we appreciate is the timely visits of the Sinclair Lubrication Engineers."

Top quality lubricants plus the assistance of Sinclair Lubrication Engineers are two of the reasons why Sinclair can play a large part in the success of *your* operation. Your local Sinclair Representative will be happy to explain the remaining reasons. Phone him or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL LUBRICANTS

save Wear and Replacement



HELPING the **MAN-IN-THE-PLANT**

Ideas . . Methods . . Gadgets

Socket-Equipped Drill Block Secures Bit at Any Desired Drilling Angle

DRILL BITS like to wander when used at an angle, or on a contoured surface.

Inaccurate holes often result, and quality depends solely on experience of the driller, who has no mechanical aids to steady the drill and set the angle.

This problem recently was solved at Temco Aircraft Corporation. The solution is a ball and socket-equipped drill block that is called "universal" by the Dallas, Texas, firm because it fits any surface contour and secures the bit at any desired drilling angle.

B. C. Ballard, of Dallas, Texas, designed the universal drill block, two of which now are stocked in

Temco's main tool crib. Ballard, a jig-builder, knew first-hand how awkward it is to use a flat, or conventional, drill block on a contoured jig or die surface.

His universal block is conventional in size. It measures $3\frac{1}{2}$ by $6\frac{1}{2}$ in., and the tool steel from which it is made is $1\frac{1}{8}$ -in. thick.

Design Features

Like any drill block, it has a hole in its center for the slipfit drill bushing that secures and guides the drill. But here, the universal block's resemblance to conventional block ends.

The hole in Ballard's block—bored for a one-inch bushing—is

centered in a ball which, in turn, is enclosed in a socket. Radius of both ball and socket is $2\frac{1}{4}$ in.

Since each has the same radius, the ball would be immovable, if Ballard hadn't made other provisions. He allowed the ball freedom to rotate within the socket by cutting the block through, from one end to its juncture with the socket.

This cut widens the socket enclosure fractionally, and the socket itself—made of two separate, semi-circular pieces, held in the block by set screws—widens just enough to give the enclosed ball sufficient clearance to move.

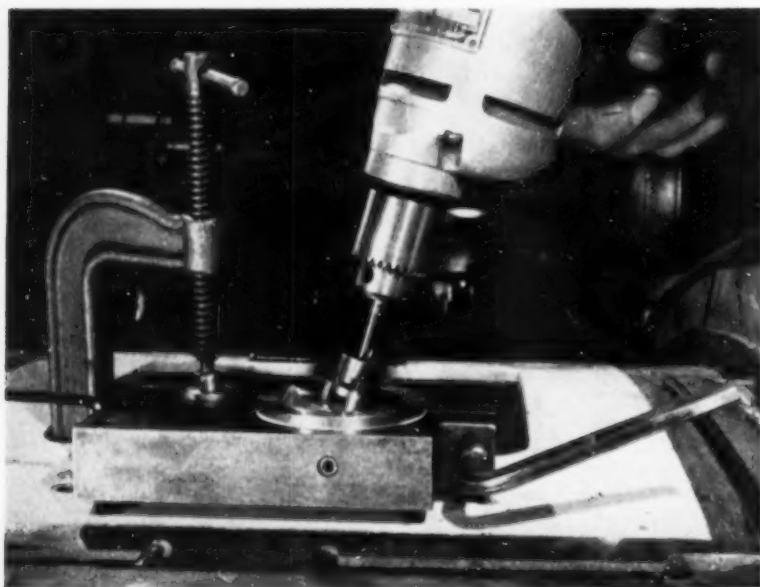
Thus, the ball, and the bushing hole within it, can be tilted to any reasonable degree for angle drilling. Once at the proper tilt, the ball can be secured in that position. This is done by tightening a cap lock screw which closes the cut in the block which, in turn, tightens the socket around the ball.

In cases where angles must be exact, to fractions of degrees, the bushing hole angle may be pre-set by setting on a sine plate.

The ball-and-socket bushing makes angle drilling fast and easy work, even for inexperienced jig or tool-makers. Other provisions in the universal block make drilling on contoured surfaces just as easy.

Socket-head jack screws are threaded into the drill block at five different points—including the block's four corners. These screws can be run out of the base of the block so that they extend like legs. On an irregular surface, the screws' exposed length is adjusted so they make the block a solid platform, then the block is secured to the surface with a C-clamp.

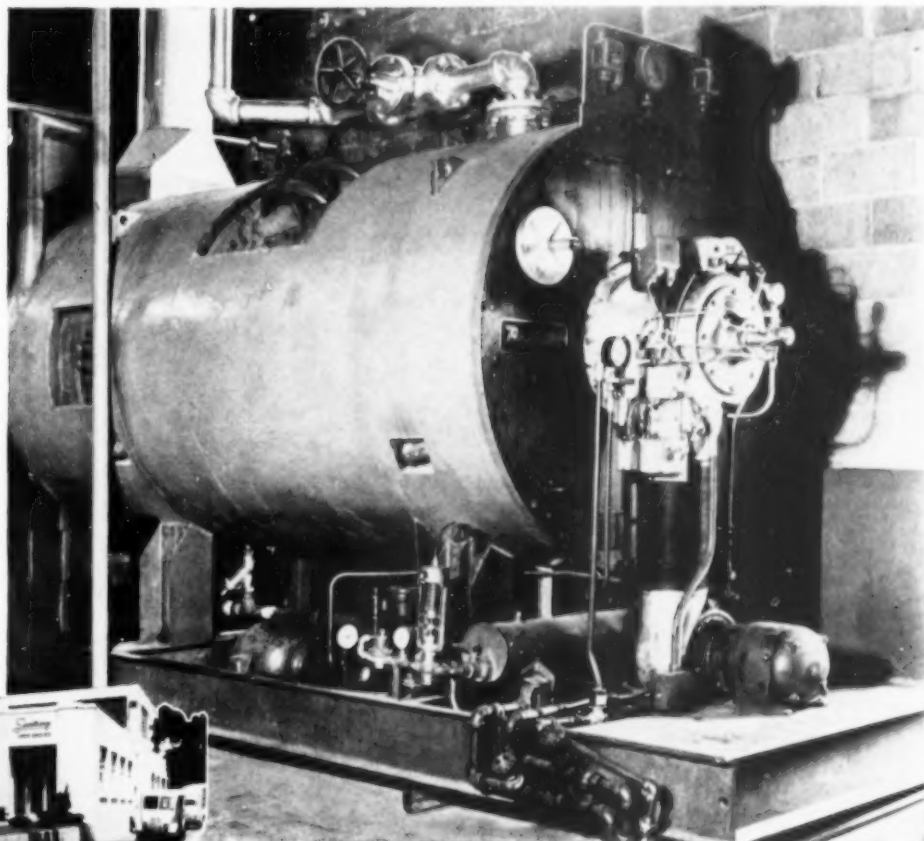
Temco Aircraft Corporation in Dallas, Texas, uses the universal block principally for enlarging holes, but the device is equally well-suited for locating holes. It can be used with a hand-operated drill, or with a drill press.



in FOOD PROCESSING PLANTS

COMPARABLE FUEL COSTS

	Old Boiler	Powermaster
Dec.	\$1304.16	\$543.07
Jan.	1062.29	748.79
Feb.	998.07	485.25
	<u>\$3364.47</u>	<u>\$1777.11</u>



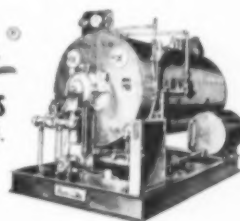
Powermaster® Operating Efficiency Pays Off

For example: An Iowa dairy cut fuel costs over 40% by replacing its original boiler with a modern oil-fired *Powermaster* a couple of years ago. And it is supplying steam for processing 150% greater volume of dairy products as well as for heating! The new boiler enabled the dairy to change to heavy oil for greater fuel economy.

Have you taken a close look at your steam costs lately? Remember, the big pay-off on a boiler is its operating efficiency... and that's where *Powermaster* excels, as many other dairies along with bakeries, bottlers, canners, packing houses, and other food processing plants have discovered since installing *Powermasters*. But instal-

lation, space-saving compactness, fast steaming, hospital-clean operation, maintenance-saving accessibility, and fully automatic operating and safety controls are other time-saving and cost-reducing advantages *Powermaster* provides. When you're in the market for a boiler, remember—Steam costs go down where *Powermasters* go in. Better send for latest descriptive bulletin today.

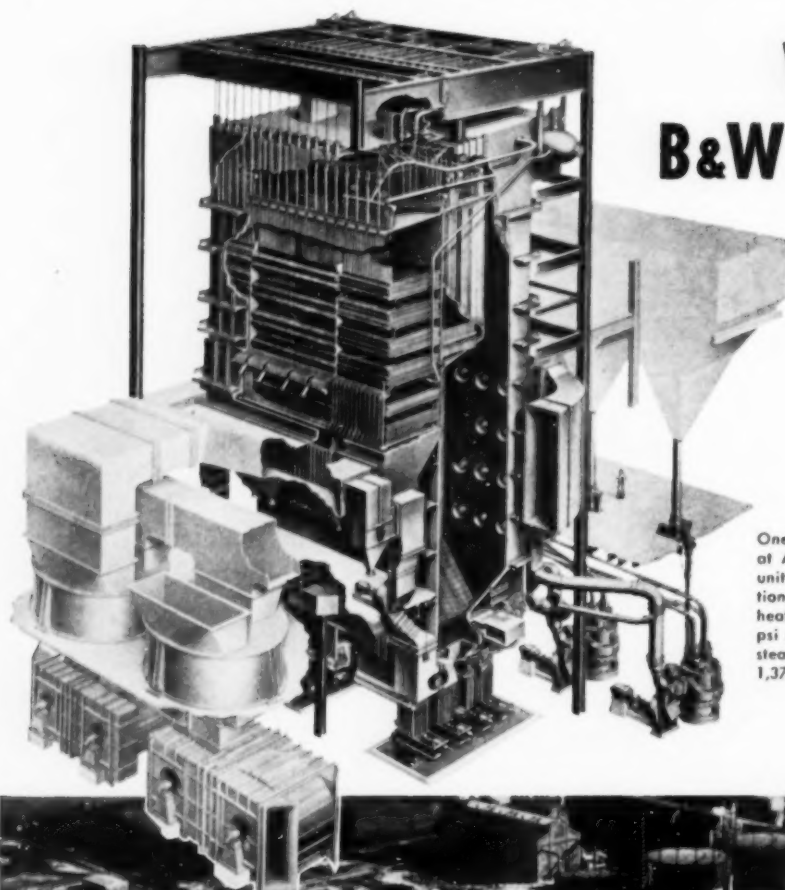
0-5
Powermaster®
PACKAGED AUTOMATIC BOILERS
In sizes to 500 HP; pressures to 250 psi.



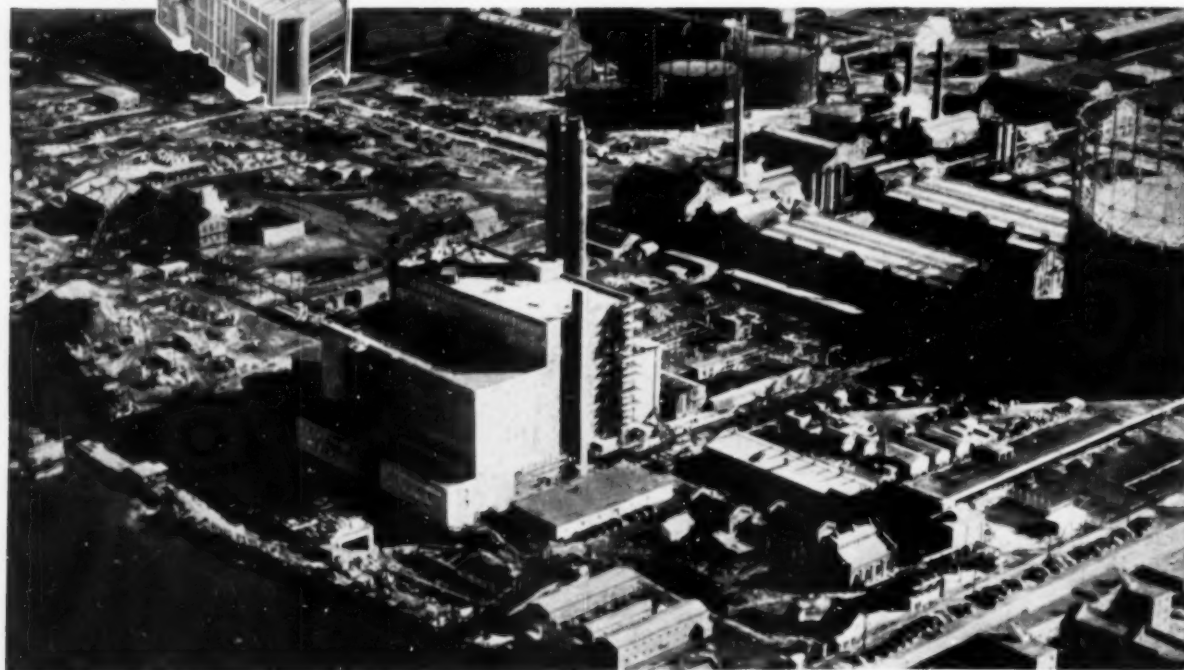
ORR & SEMBOWER, INC. • Established 1885 • Morgantown Road, Reading, Penna.

Astoria Station

With More B&W Pressure-Fired Boilers



One of two Pressure-Fired B&W Boilers installed at Astoria. This dry-bottom, Radiant Reheat Type unit incorporating B&W Divided-Furnace construction, has a design pressure of 2050 psi. Superheater outlet pressure and temperature are 1850 psi and 1000 F, with reheat to 1000 F. Designed steam output ranges between 1,200,000 and 1,370,000 lb per hr, depending upon type of fuel.



Astoria Generating Station of Consolidated Edison Co. which will ultimately have a generating capacity of about 1,000,000 kw.

Goes on the Line

New from foundations to stacks, Astoria Station of the Consolidated Edison Co. of New York, Inc. represents a considerable advance in steam-electric power generating facilities. Significant features of this modern station include Pressure-Firing, one boiler-per-turbine, Cyclone Steam Separators for natural circulation, extra-fast starting of boiler and turbine, above-normal-capacity auxiliaries, and automatic shut-down protection.

Pressure-Fired Boilers

The two Pressure-Fired B&W Boilers are the largest units in the world without induced draft fans. Pressure-Firing was selected for this station on the basis of service-proved economies and advantages. These include:

1. Greater efficiency due to elimination of air infiltration with consequently lower stack loss.
2. Elimination of cost of induced draft fans with attendant controls, foundations, and ducts.
3. Savings in installed kilowatts for auxiliaries.
4. Savings in operating power needed for fans.
5. Reduced maintenance due to elimination of induced draft fans.
6. Smoother operation, simpler controls, and easier starting with only forced draft fans.

Natural Circulation with Cyclone Steam Separators

B&W Cyclone Steam Separators in the steam drum do a two-fold job. Separation of circulating water from steam is virtually one hundred per cent, thus assuring a high circulating head at all times. In addition, the Cyclones, in conjunction with steam scrubbers, help maintain turbine efficiency and reduce turbine maintenance by delivering steam of extremely high purity.

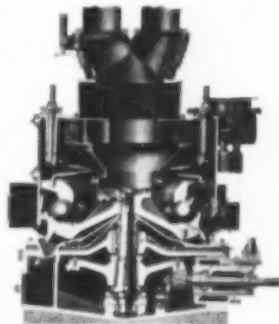


Building Saving with Divided-Furnace Construction

The simple B&W Divided-Furnace construction makes it feasible to achieve the required furnace cooling surface without an excessive increase in building volume. Substantial savings in steel work and other structural components are made possible.

Type EL Pulverizers and Multi-Fuel Burners

Each unit is served by five B&W Type EL Pulverizers which utilize the ball bearing principle of grinding. There are 22 circular burners suitable for use with oil, gas, or coal on each unit. Low maintenance is an outstanding feature of the EL Pulverizer which has long-life grinding elements made of a special abrasion-resistant material. Designed for ease of operation and simplified control, this design of pulverizer satisfies every requirement for economical, efficient direct-firing of pulverized coal.



* * * * *

These and many other B&W engineering advances developed to increase the efficiency of steam generation are providing satisfactory and economical central-station and industrial service in plants across the country.

We will be glad to discuss them in terms of your future plans for boiler replacements or additional plant. For a detailed description of the features incorporated in Consolidated Edison's new Astoria Station, write for Bulletin 3-560. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

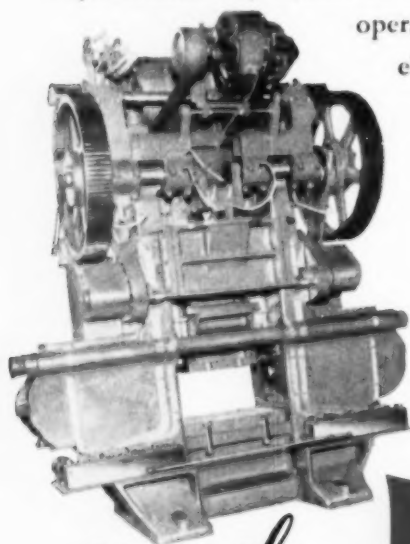


IT COSTS TOO MUCH NOT to have Manzel Lubricated Machinery

Add the cost of:

1. Breakdowns due to faulty lubrication.
2. Wasted oil (Manzel cuts it up to 90%).
3. Labor in hand oiling.

...and you'll agree Manzel Force Feed Lubrication costs *less*. Manzel lubricators are furnished as standard equipment on many leading makes of presses, shears, pumps, engines and other machinery. They can be installed on your present equipment—synchronized by ratchet or direct lever drive, or operated by a separate electric motor.



We will gladly have a Manzel lubrication engineer submit recommendations without obligation. Just write...

Manzel

318 BABCOCK STREET
BUFFALO 10, N. Y.



A DIVISION OF FRONTIER INDUSTRIES, INC.

\$\$\$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

Southern Power & Industry
806 Peachtree St., N.E.
Atlanta 5, Georgia

How to Solder Heater Wires

YOU cannot solder heater elements with the "mine run" type of solder (50% tin, 50% lead) since their melting points are much too low. When going into the higher temperatures one also has difficulty with the fluxes and the heating device used for the soldering operation.

One answer is the use of silver solder, where the soldering iron gives way to the torch using either Presto-Lite, Pyrofax, or perhaps the combination air-natural gas torch. It is quite possible to use the oxyacetylene torch with a reduced flame. Clean the heater elements well with emery cloth and wrap a few turns of light iron wire about the parallel ends—just enough to hold the two in place as heat and solder are applied. The tendency is for them to spring apart as the result of heat causing expansion.

Apply heat sparingly until the wire glows faintly, then apply borax as the fluxing medium and continue heat until the red tint turns to straw color, then apply the silver solder.

Flux substitutes are Fluron sold in most mechanics' shops, or in a real pinch make a raid on the pantry to purloin some of the old reliable baking soda.—Paul C. Ziemke—Tenn.

NOW... interchange Gas and Oil firing in 10 seconds

Modern Cleaver-Brooks
Model LR Steam Boiler
Equipped with Exclusive
Cleaver-Brooks "10-second
conversion" Combination
GAS and/or OIL Burner



TWO, simple motions eliminate time-consuming change-over

Now you can use oil or gas at the flick of a switch! This exclusive new Cleaver-Brooks development permits changeover from oil to gas or vice versa in only 10 seconds.

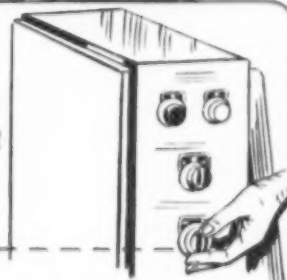
That's because the Cleaver-Brooks Combination Gas and/or Oil Fired Boiler operates on gas *with the oil burner in place*. Simply flipping a selector switch on the control panel to either gas or oil sets the proper circuit in action. Turning the convenient fuel supply valves completes the entire changeover — and in 10 seconds or less!

To gas users in all parts of the country — and in particular areas where local requirements demand immediate changeover — this exceptional fuel flexibility can be an important factor in determining your overall operating economy.

Ten-second conversion, like 4-pass construction, self-contained design, guaranteed 80% efficiency when firing with oil, is another "plus" feature pioneered by Cleaver-Brooks. It demonstrates Cleaver-Brooks' continuing effort to bring steam users even greater flexibility and reduced operating costs.

If you are considering simplifying your present boiler plant, remember Cleaver-Brooks Combination GAS and/or OIL Fired Boilers. Sizes 15 to 500 h.p. — 15 to 250 p.s.i. Write for complete facts.

1 TURN
SELECTOR
SWITCH
TO GAS
OR OIL



2 TURN OFF ONE FUEL
LINE AND OPEN THE OTHER



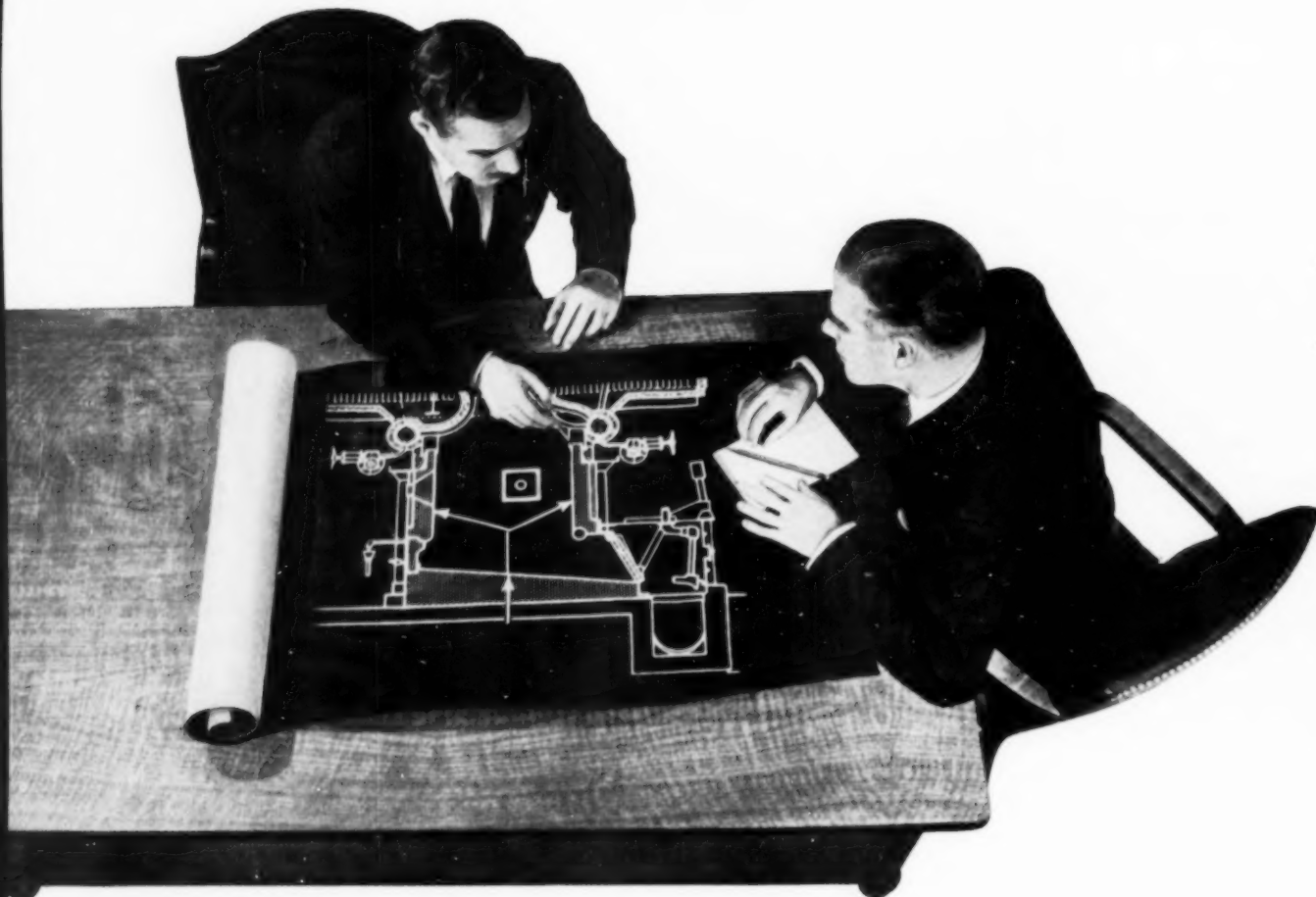
Cleaver-Brooks

Originators of the
Self-Contained Steam Boiler



CLEAVER-BROOKS COMPANY
Dept. B, 305 E. Keefe Ave., Milwaukee 12, Wis., U.S.A.
Cable Address: Clebro-Milwaukee

Builders of Equipment for the Generation and
Utilization of Heat • Steam Boilers • Oil and Bitumen
Tank-Car Heaters • Distillation Equipment • Oil and
Gas-Fired Conversion Burners



PROMINENT PUBLIC UTILITY

Cuts ashpit maintenance with B&W Refractory Concretes

A trial installation of B&W Refractory Castable "A", a 2600 degree refractory concrete, was made in one boiler ashpit. To date this castable has given 25 months more maintenance-free service than the refractories previously used.

Results of this first trial were so encouraging that another ashpit, shown in the drawing above, was lined with B&W Refractory Castable "A". In this installation the two opposing high velocity water sprays cut refractories life two ways. First, water splattered on the hot walls (about 1800F) caused spalling. Second, the high velocity water jets had an abra-

sive effect on the floor refractories.

Here's the report: "After 20½ months service, B&W's Castable "A" lining was still in excellent condition—far superior to the refractories used before."

On the basis of these trials three other boiler ashpits have been lined with this 2600 degree castable.

In addition to ashpit linings, B&W Refractory Castable "A" is widely used in boilers for baffles, hearths, door linings, special shapes, repairing eroded brickwork and forming pier walls in stoker-fired boilers.

B&W Castable "A" is only one of

a line of B&W Refractory Concretes which cost-conscious boiler operators are putting to increasing use in many different applications. These B&W Concretes may help you cut installation costs and lengthen furnace life. Consult your B&W Field Engineer.



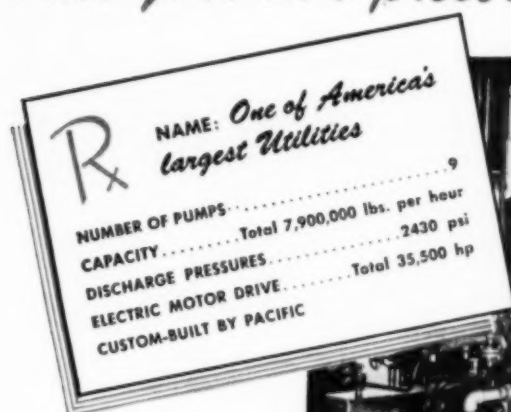
B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick
B&W Refractory Castables, Plastics and Mortars • **OTHER B&W PRODUCTS**—Stationary & Marine Boilers and Component Equipment...
 Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

2470A

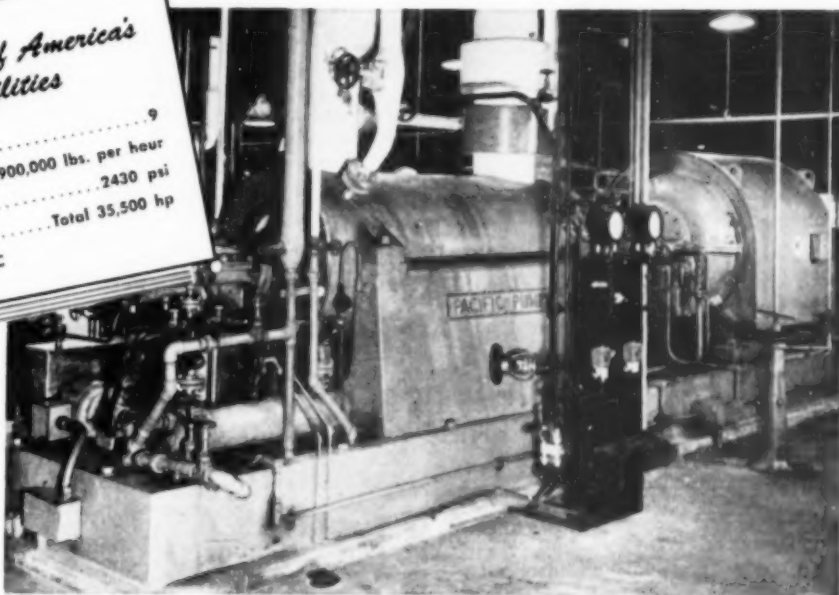
Pacific BOILER FEED PUMPS

are Custom-Built
to your specifications

Write your own "prescription":



Pacific Boiler Feed Pumps are fabricated from selected materials to provide the utmost structural strength and stability — maximum resistance to corrosion-erosion and wear. Built in multi-stages for capacities to 2700 gpm; discharge pressures to 3000 psig; speeds to 5000 rpm.

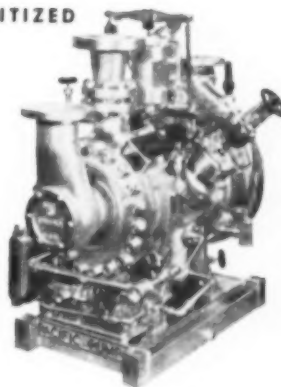


Pacific SINGLE STAGE UNITIZED STEAM TURBO PUMPS

*less unit cost—
less floor space—
steady dependable output!*

Capacities to 500 gpm
Discharge Pressures to 1100 psi
Steam to 900 psi—850° F. TT
Exhaust Pressures to 50 psi
Speeds to 10,000 rpm

Write for bulletins 109 and 118



PACIFIC
Precision Built
PUMPS

Pacific Pumps inc.

HUNTINGTON PARK, CALIFORNIA

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Dispatching and Distribution Improved

By Henry Startzman, Ch. Engr.
The Potomac Edison Co.
Hagerstown, Md.

THE Potomac Edison Company system supplies electric service to Western Maryland and the contiguous portions of Pennsylvania, Virginia and West Virginia. The three major steam generating stations located at Williamsport, Md.; Cumberland, Md., and Riverton, Va., are connected by transmission lines that form a triangle about 60 miles on each side. This triangle is the basic transmission backbone of the system and has just been completely converted to 132,000 volts.

Prior to the conversion, the eastern corner of the triangle terminated at the R. Paul Smith Station at Williamsport, Md., and the system load dispatchers were located there also. Because of the crowded conditions at the Smith Station and the possibility of flood damage, a new transmission substation has been built across the Potomac River from the Smith Station, on high ground in West Virginia. This is designated as the Marlowe Substation. It was started in mid-1952 and when entirely completed will cost in excess of \$800,000.

Not only do the two 132 kv lines forming the sides of the transmission triangle from Cumberland, Md., and Riverton, Va., terminate at Marlowe, but also high tension lines to Frederick, Reid, Martinsburg, Marion, etc. New lines connect the Smith Station with the new Marlowe Substation.

Facilities

The new substation contains the latest type relays and oil circuit breakers arranged for 20-cycle reclosing, using carrier current for relaying. A 40,000 kva, three phase transformer supplies the 33 kv bus from the 132 kv line.

The load dispatchers have been transferred from the Smith Station to the new building at the Marlowe Substation. It has become the nerve center of the Potomac Edison System. One entire wall of the new building is taken up by a

system diagram. It is built up of sheet steel using colored adhesive tape for designation of lines and equipment. Colored Alnico magnets are attached to the board to show changes in conditions. A glance at the board shows the operating conditions that exist at any time.

To aid the load dispatchers in the control of the flow of power not only are there meters that show the flow of power in local circuits, but by means of telemetering the amount of power flowing in the in-

(Continued on page 100)

Bulk Handling of Carbon Black

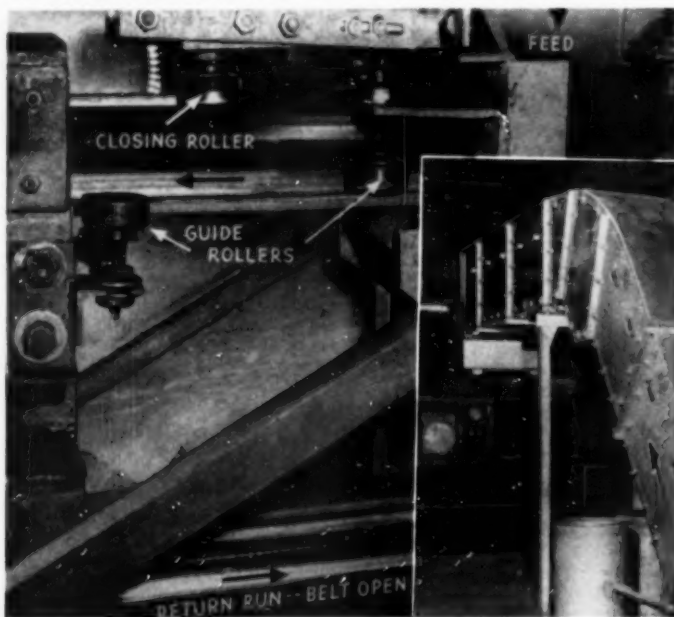
No dust problem in Oklahoma plant with modern enclosed belt conveyor-elevator handling system.

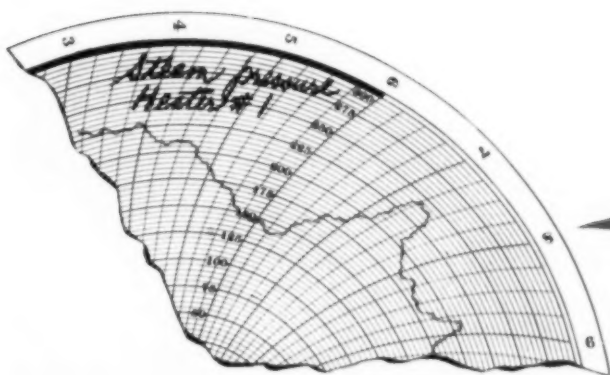
AT THE Miami, Oklahoma, tire and tube plant of the B. F. Goodrich Company carbon black is received in bottom dump closed hopper cars. The original bulk black handling system utilized screw conveyors, but when it became necessary to expand the system a Zipper (Stephens-Adamson) enclosed belt conveyor-elevator was selected.

The new Zipper moves black a total horizontal distance of 178 ft with a vertical lift of 70 ft. The lift is made in two steps with a slope lift of 7 feet and a vertical lift of 63 ft. Since the conveyor-elevator operates in the open it is totally enclosed in a steel casing. It discharges to a three-compartment steel bin at a rate of 9½-tons per hour. From the tank the black moves to a combined weigh hopper and blending bin and is then discharged to a mixer. Since the Zipper belt moves with the black and totally encloses it there is no dust or degradation.

DETAIL VIEW of closing rollers at Zipper feed point. Belt returns to feed point open, with teeth unmeshed, and is "zipped" shut after loading. Since conveyor-elevator operates in the open, it is totally enclosed in a steel casing. Inset shows Zipper making S-curve to avoid obstruction on penthouse roof.

Courtesy Stephens-Adamson Mfg. Co.





Same size seat and head
for all pressures to 300 psi!

Is this your steam **TRAPPING PROBLEM...**

Changing seats and heads for varying
loads or pressures to 300 psi?

HERE'S HOW to select the right trap!

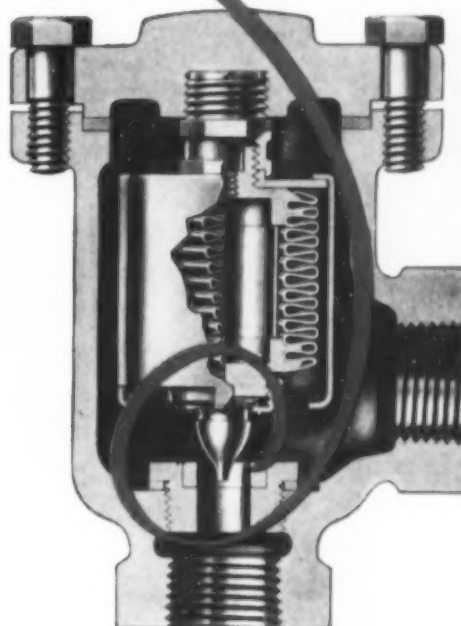
First thing to do is to define exactly what you expect the trap to do—and then select 1 of the 5 *different* types best suited for the job on hand. If you need a trap with *one or all* of the following characteristics, then the Sarco Thermostatic Trap is your best bet.

1. No changing of seats and heads for varying loads or pressures to 300 psi . . . the thermostatic element is *self-adjusting*.
2. High capacity with small size ($\frac{3}{4}$ " trap fits palm of hand) . . . offers greatest capacity per dollar cost.
3. Large capacity air venting *regardless of steam pressure*; also freeze-proof, trap is wide open when cold.
4. Easy maintenance: bellows is only working part . . . can be removed, inspected and replaced in a few minutes.

HELPFUL BULLETIN: Send for Bulletin 145, "Selecting The Right TYPE Steam Trap." Gives characteristics of each type of trap and shows which type to use on various installations.

ENGINEERING SERVICE: Because only Sarco makes all five types of traps, Sarco can give you impartial advice on your trapping problems. Check your local Sarco sales representative next time a problem arises, or write Sarco Company, Inc., Empire State Building, New York 1, N. Y.

SARCO improves product
quality and output

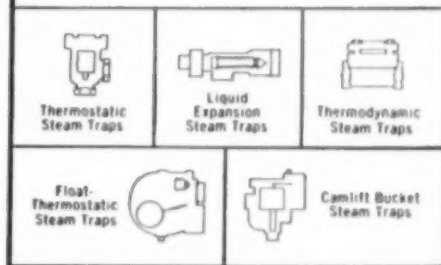


**SARCO BALANCED PRESSURE
THERMOSTATIC STEAM TRAP**

Sizes $\frac{3}{4}$ " to 2", pressures to 300 psi.
Write today for Bulletin 250.

Only Sarco Makes All 5 Types

... that's why Sarco can give
impartial advice on trap selection



STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

(Continued from page 98)
terconnection west of Cumberland is also shown.

Because of its position as the load dispatching center, Marlowe has become the focal point of all of the company's communication system. From here telephone lines radiate to all points on the company property. In addition, carrier current equipment is installed for relay operation. Also, some other substations are being arranged so that they can be operated remotely by supervisory control from Marlowe. Here, too, is located the eastern terminal of a micro link to Cumberland. This new facility furnishes five channels for voice communication between Marlowe and Ridgeley (Cumberland). It also provides two telemetering channels to supply the load dispatchers with metering of the flow of power into the Potomac Edison System from Lake Lynn and Albright.

One channel of the micro wave

is used to control a radio transmitter on Fairview Mountain, about 10 miles west of Hagerstown. This transmitter is used in conjunction with mobile radio units in the line trucks in the Hagerstown, Waynesboro, Pa. and Martinsburg, W. Va. districts. A similar transmitter at Dan's Rock, West of Cumberland, is for use in communicating with line trucks in the Cumberland and Frostburg Districts and will also be controlled by a micro wave channel. Marlowe is only about 50 miles air line from Cumberland, but because of the contour of the intervening land it is necessary to have repeater stations at Fairview Mountain, Sideling Hill and Dan's Rock.

Marlowe substation now almost completed is the most modern installation on the Potomac Edison System. It represents another step in the company's program to provide adequate facilities to properly supply the ever-growing demand for electric service.

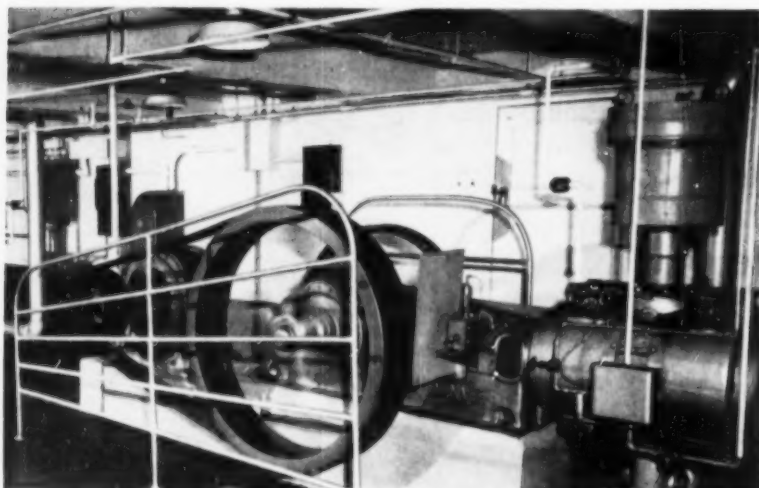
Compressed Air Utilization

THE Anniston Manufacturing Company, Anniston, Alabama, manufactures cotton drills, twills, etc. Cleaning, operation of control instruments and humidification are the three general uses of compressed air. The compressors sup-

plying the air operate at both high pressure (80-90 lb) and low pressure (40-50 lb). With the exception of using air to blow off lint, all air pressures are regulated at the point of use.

When air is used to blow off lint,

One of several Gardner-Denver compressors in the Anniston Manufacturing Company, Anniston, Alabama.



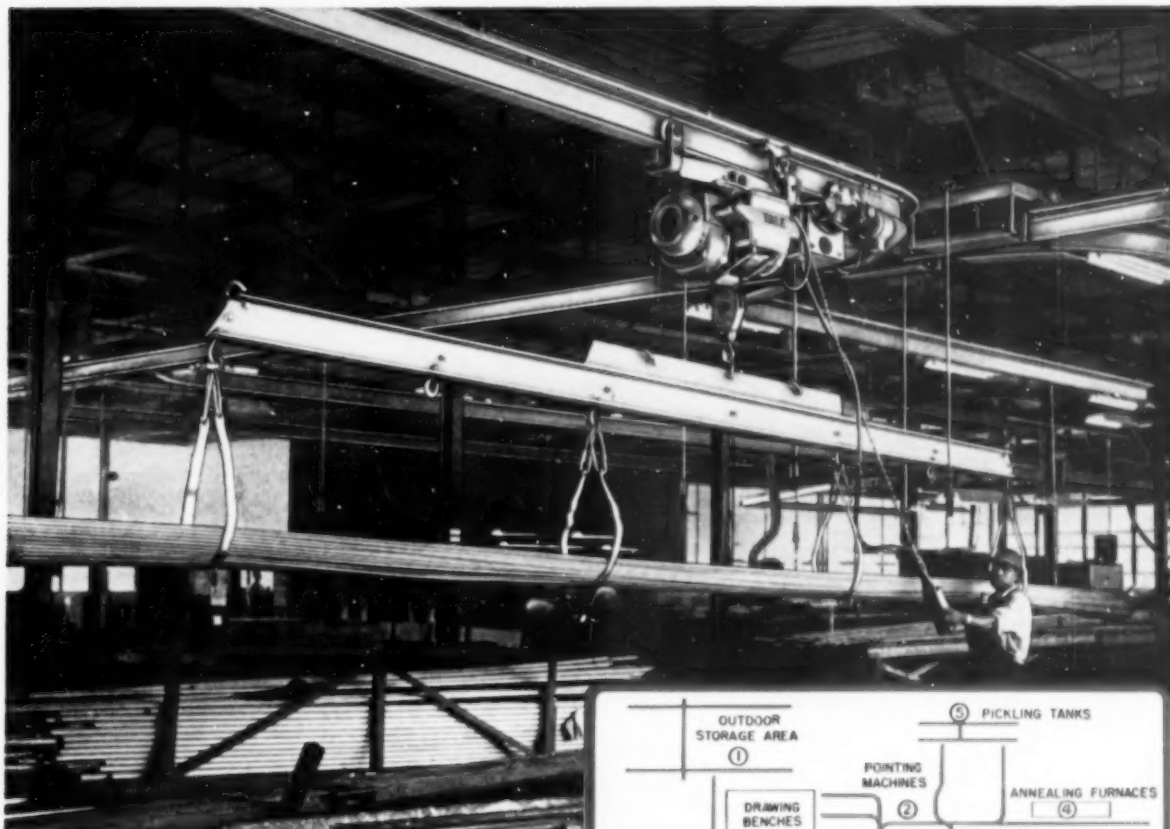
HELPING the MAN-IN-THE-PLANT

especially in a weave room which usually has high humidity, pressure under 60 lb does little good; so it is therefore necessary to have sufficient compressor capacity to keep the air pressure above 60 lb. The same compressors that normally furnish 80 lb pressure furnish air to the "lifts," automatic doors, instrument controls, etc., through regulators. The low pressure compressors supply air to all the humidifying equipment which is mostly atomizers. The supply is normally 45 lb regulated to 27-28 lb. Should the pressure drop below 25 lb, the atomizers fail to operate normally and operation of the mill is greatly impaired; therefore it is imperative to have sufficient air capacity at the low pressure.

Any air used in a cotton mill must be as free as possible from water and oil. Oil or water blown on the cotton naturally does material damage and can also cause the control instruments to fail in operation. Each compressor is equipped with an aftercooler and separator to remove as much oil and water as possible before it gets to the air lines. Filters are also installed at various points in the air lines. For further protection, individual filters are usually installed at each control instrument. Thus, the necessity of periodic inspections and keeping the compressor as well as the compressor's lubricating system in top condition can readily be seen.

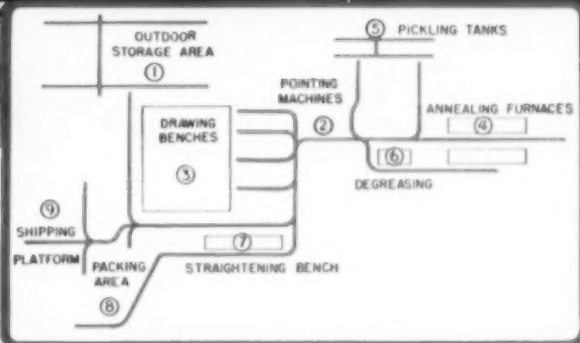
In 1945, one 6"x6", one 8"x8", and one 12"x11" compressor supplied all the air necessary at the plant. Today, however, with an expansion of about 10%, they have in constant use one 8"x8", one 9"x12", three 12"x11", and one 14"x11" compressors. All air lines can be tied together at various points in case of failure of any compressor or in case of periods of reduced operations during which time only such compressors necessary to supply the load are run.

You can do it better with Louden engineered monorail!



Hard-to-handle materials or shapes? Let Louden's long experience lick it.

Louden pioneered monorail handling. This longest and broadest experience with this most adaptable and most flexible of all materials handling methods naturally offers many *extra* benefits to men seeking answers to any handling problems. Shown above is part of a Louden SuperTrack System in a well-known eastern factory where a Louden MotoVeyor makes easy work of the speedy handling of long, flexible, easily-damaged tubing. The hoist has 2,000 pounds capacity and the MotoVeyor travels at 125 feet per minute. This Louden Monorail System



also connects with the pickling house where a Louden Monorail Crane speedily and safely handles various sizes of tubing through the series of vats. Benefit by Louden experience on YOUR next handling problem.

THE LOUDEN MACHINERY COMPANY
4202 Broadway, Fairfield, Ia.



MONORAIL & CRANES



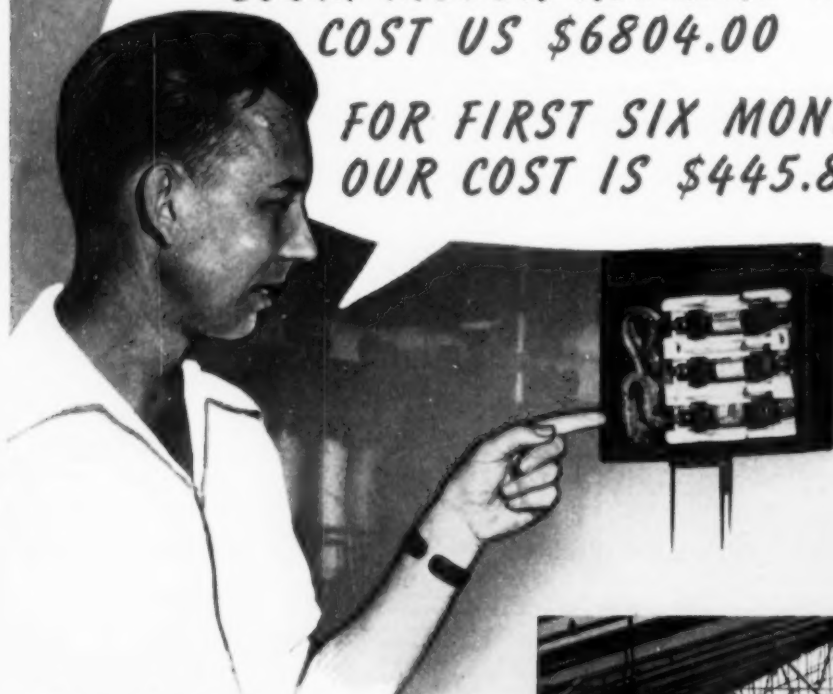
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Write for your copy of "Economical Material Handling" ... full of time-saving, cost-cutting ideas and case histories. Free ... no obligation.

Since 1867—the first name in materials handling

Commander Mills, Inc., Sand Springs, Oklahoma
Chief Electrician, Wm. Bert Peacock, Speaking . . .

**"LOOM MOTOR REPAIRS IN 1949...
 COST US \$6804.00**

**FOR FIRST SIX MONTHS OF 1953
 OUR COST IS \$445.84"**



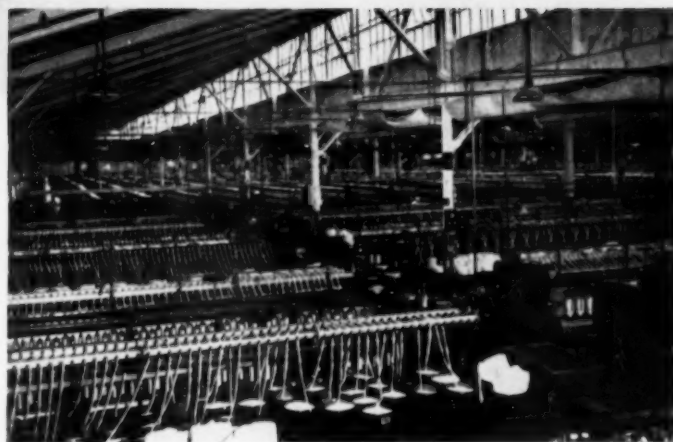
**"Protecting motors with
 FUSETRON fuses is saving us
 about \$6000.00 per year."**

"We have a thousand looms, 90 of which are powered by 1 hp motors, 180 by 1½ hp, 100 by ½ hp, 630 by ¾ hp. Prior to 1949 several hundred of these were rewound each year. In fact, they carried them out by the truck loads to the motor rewind shop.

We started using Fusetron Fuses in the winter of 1949 and began to keep individual records on motors. The reduction on motor burn-outs was immediately noticeable. In 1950 only 44 loom motors were repaired.

There is no way to know how much damage was done to motors prior to our new system of maintenance, and it is my belief that some motor repairs now are due to partial damage done prior to 1949.

"In the entire plant we have over 2,500 motors, representing a little more than 5,000 hp connected load. The following list shows our actual expenses on motor repairs:"



YEAR OF REPAIRS	NUMBER OF MOTORS (No Record Kept)	AMOUNT
1949		\$6,804.00
1950	87	2,796.20
1951	59	2,640.44
1952	63	2,165.63
1953 (1st 6 mos.)	23	445.84

BREAKDOWN OF RECORD FOR MOTOR REPAIRS FOR PAST 6 MONTHS:	NUMBER OF MOTORS	DATE OF REPAIRS	AMOUNT
	3	JAN.	\$ 76.37
	4	FEB.	88.62
	3	MAR.	70.62
	4	APRIL	87.75
	4	MAY	101.86
	2	JUNE	20.62
			\$445.84 "

Commander Mills, Inc., Sand Springs, Okla.

Superintendent W. R. Swafford, in charge of Manufacturing, says:

**"WE AVOID UNNECESSARY
SHUTDOWNS AND PREVENT
MOTOR BURNOUTS BY USING
FUSETRON FUSES"**

"In the sewing room we have 70 machines using $\frac{1}{2}$ hp, 3-phase motors.

"They are all equipped with Fusetron fuses rated at 3.2 amperes. Formerly, we used 30 ampere fuses to avoid unnecessary blowing on the starting surges of the machines.

"The Electrical Department installed these smaller Fusetron fuses several years ago, and we have not had any trouble with blowing them needlessly and neither have we had any motor burnouts.

"We believe it better to blow a fuse than burn out a motor!"



**You too, can profit by the
10 POINT PROTECTION of FUSETRON dual-element FUSES**

- 1* Protect against short-circuits.
- 2 Protect against needless blows caused by harmless overloads.
- 3 Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation.
- 4 Provide thermal protection — for panels and switches against damage from heating due to poor contact.
- 5 Protect motors against burnout from overloading.
- 6 Protect motors against burnout due to single phasing.
- 7 Give DOUBLE burnout protection to large motors — without extra cost.
- 8 Make protection of small motors simple and inexpensive.
- 9 Protect against waste of space and money — permit use of proper size switches and panels.
- 10 Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York City in December 1947.

FOR MORE INFORMATION use this Coupon ➔



FUSETRON is a trademark of the
Bussmann Mfg. Co.,
Division of McGraw
Electric Co.



BUSSMANN Mfg. Co. (Division of McGraw Electric Co.)
University at Jefferson, St. Louis 7, Mo.

Please send me complete facts about FUSETRON
dual-element Fuses.

Name _____

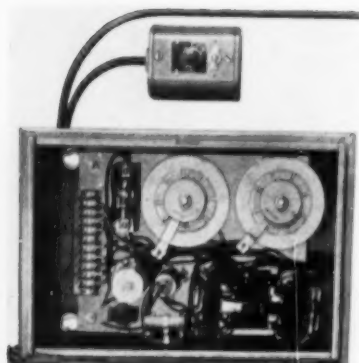
Title _____

Company _____

Address _____

City & Zone _____ State _____ 154

Equipment..Supplies..Methods



Clark magnetic amplifier motor drive consists of three components—main control panel, control station, and motor (not shown).

Magnetic Amplifier Motor Drive

B-1

CLARK CONTROLLER COMPANY, 1146 E. 152nd St., Cleveland 10, Ohio, has introduced a magnetic amplifier motor drive, which is a compact, self-contained unit that will provide adjustable motor speeds from an a-c power source.

The device converts a-c power from

a 115 volt 60 cycle source to d-c power which is used to drive a d-c motor. Speed is continuously adjustable over the complete range by means of the small rheostat located on the control station.

The standard unit will provide for a speed range of 10 to 1 and is available with motors ranging in size from 1/40 hp up to and including 1/2 hp.

The device employs a full wave, self saturating, magnetic amplifier unit containing no tubes or moving parts. Full wave conversion permits the use of a motor one frame size smaller than that required for half-wave units since there is less heating on full wave applications. Because there are no electronic tubes or moving parts, no warm-up period is required before

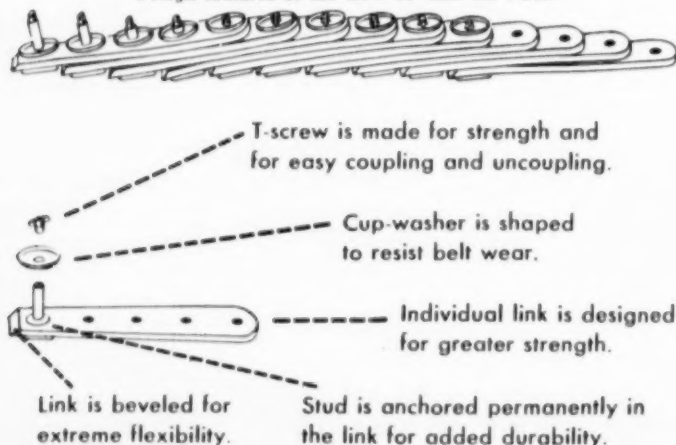
Adjustable V-Belt

B-2

MANHEIM MANUFACTURING & BELTING COMPANY, Manheim, Pa., is producing a new Veclos adjustable v-belt for D and E drives, known as TD and TE. These new link v-belts are made of plys of especially treated high-tensile strength canvas duck, joined by

riveted studs with removable cup-washers and T-screws. This construction gives strength and durability at all key points yet enables the belts to be coupled and uncoupled easily. Two types are available: Regular Rubber Coated for general services and Oil-Proof for oily and high temperature drives.

Design features of the new TD and TE v-belt.



Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

applying the load, and maintenance requirements are greatly reduced.

Flow Rate Regulator

B-3

W. A. KATES CO., 430 Waukegan Road, Deerfield, Ill., has announced an economical new flow rate regulator designed to control flow of both clear liquids and liquids containing light solids.

This self-contained unit will accurately regulate the flow of light slurries, many suspensions, hot tar solution and similar materials, despite fluctuations in either inlet or outlet pressure. Down-flow design, specifically engineered to provide self-cleaning characteristics, prevents clogging and blocking by solids, and provides for complete drainage of the regulator with drainage of the piping system.

The device uses no air lines, pressure regulators, air filters, seal pots, or other mechanisms. Once the pointer has been set for the desired flow rate, any change in either inlet or back pressure results in an immediate correction of flow rate. Time lag and hunting for the set point are eliminated.

Kates Type SA Regulator is direct acting, which minimizes maintenance while providing fast, positive regulating action.



Here's a *Real*

STEAM TRAP PACKAGE

WANT FAST HEAT-UP OF OFF-AND-ON PIPE COILS, HEADERS, UNIT HEATERS, ETC.?

Speed heat-up with Armstrong thermic bucket traps. When steam is first turned on, air is pushed out the large thermic vent—fast! As soon as steam reaches the trap a thermic strip closes the vent, then the bucket functions as a regular bucket. Traps with thermic vent buckets discharge air 50 to 100 times faster than other traps.



NEED A CHECK VALVE AHEAD OF TRAP?

Just specify Armstrong with internal check valve. No check valve installation labor or fittings needed. Spring loaded action and vertical position minimize danger of dirt holding valve open. The Armstrong internal check valve is top quality—long lasting.



NEED A STRAINER AHEAD OF TRAP?

Save money with Armstrong built-in strainer traps. They cost less than a separate trap and strainer and save installation time and money. Stainless steel screen lasts a long time.



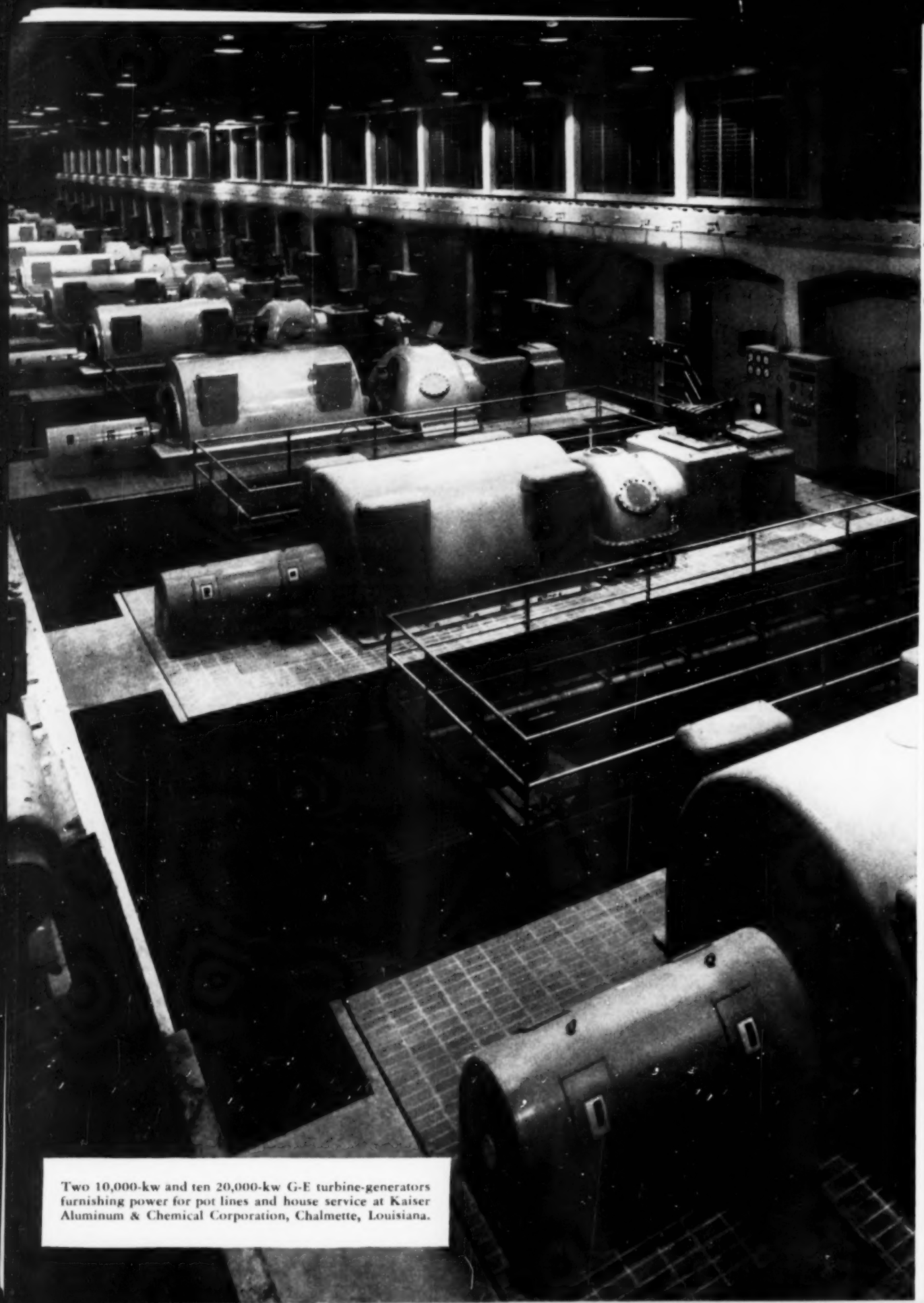
Get the full facts about all Armstrong traps. Send today for free Catalog J, The Armstrong Steam Trap Book.



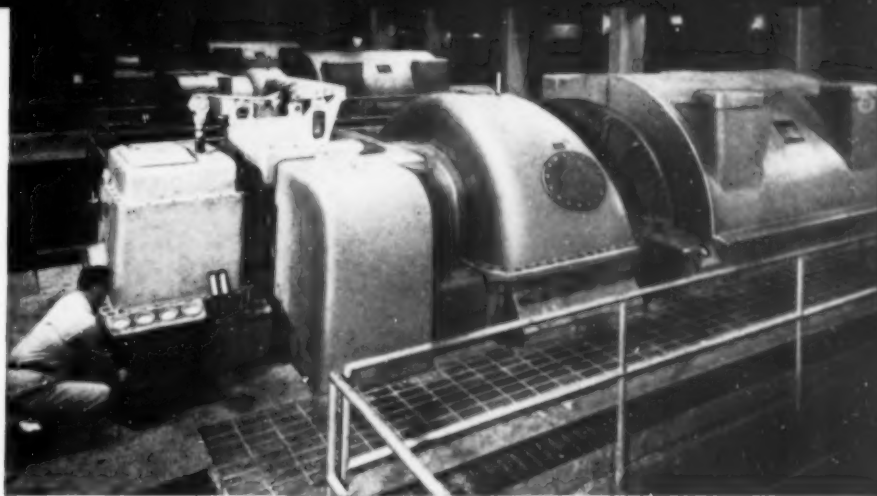
ARMSTRONG MACHINE WORKS
806 Maple Street • Three Rivers, Michigan



ARMSTRONG STEAM TRAPS



Two 10,000-kw and ten 20,000-kw G-E turbine-generators furnishing power for pot lines and house service at Kaiser Aluminum & Chemical Corporation, Chalmette, Louisiana.



G-E Service Engineer making final inspection of 20,000-kw G-E turbine-generator at Kaiser Aluminum & Chemical Corporation. Two 10,000-kw units in background furnish power for house service.

Kaiser Aluminum Operates Sixteen G-E Turbines in Huge New Plant

KAISER ENGINEERS SELECT G-E TURBINES FOR QUICK DELIVERY; 12 UNITS FURNISH POWER FOR POT LINES; FOUR OTHERS SUPPLY ALL PLANT SERVICES.

When Kaiser Engineers planned the new Kaiser Aluminum and Chemical Corporation plant at Chalmette, Louisiana, they were faced with needing large blocks of power, at specified times, as each pot line was ready to produce aluminum. General Electric turbine-generators were selected, and two 10,000-kw and fourteen 20,000-kw units were ordered because they could be built and installed on time—ready to produce power on schedule.

Six pairs of turbine-generators will deliver 240,000 kw of power to the pot lines. Four other G-E turbines furnish power for all plant services and provide stand-by power.

ENGINEERS WORK TOGETHER

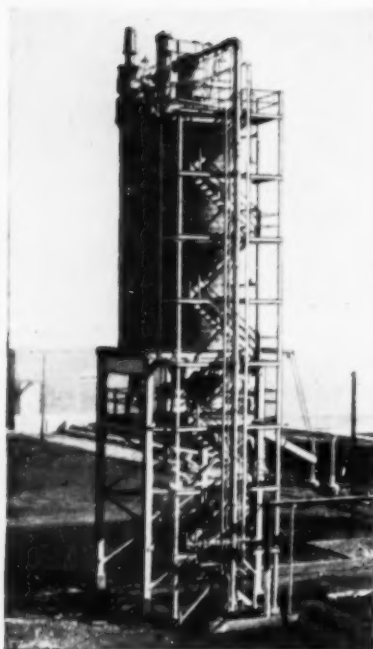
General Electric engineers worked closely with Kaiser Engineers as they do with all companies to achieve over-all project co-ordination on the installation of turbines, switchgear, transformers, rectifiers, etc.

Why not call in G.E.'s experienced engineers to explain the advantages of General Electric equipment in your next turbine installation. If your plant uses quantities of steam, check the economies of G-E automatic-extraction turbines used to supply low-pressure process steam and economical by-product power. Get more for your turbine dollar with G-E turbine-generators. General Electric Co., Schenectady 5, N. Y.

250-6

You can put your confidence in—

GENERAL  ELECTRIC



A National Installation at the CHEMSTRAND CORPORATION in Decatur, Alabama

turn the EXPERIENCE OF OTHERS to your advantage

Many important engineers have learned that National Ash Conveyor Systems save money. A survey of your own plant will cost you nothing but it may result in cutting your expenses as it has the plants listed.

When you install a

NATIONAL PNEUMATIC STEAM ASH REMOVAL SYSTEM

you can count on long life with minimum down time for repairs. Rugged construction, careful engineering and expert National Servicing have made strong friends of our clients.

Representative NATIONAL INSTALLATIONS:

Central State Hospital • Cluett, Peabody & Co., Inc. • Fisher Body Division, G.M.C. • Memorial Hospital • National Distillers Chemical Corp. • Naval Industrial Reserve Shipyard

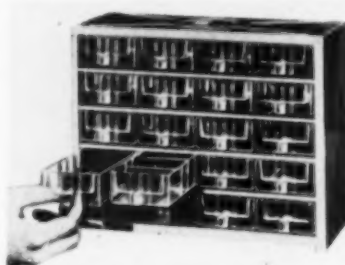
Send today for informative catalog illustrating typical applications.

NATIONAL CONVEYORS COMPANY, INC.

25 INDUSTRIAL AVENUE
FAIRVIEW, NEW JERSEY

Manufacturers of The National
ChipVeyer System for Metal Turn-
ings - Furnace Doors - Feeders - Ash
Outlets and Related Equipment.

new equipment (continued)



Plastic Drawer Cabinet

B-7 GENERAL INDUSTRIAL Co., 5738 N. Elston Ave., Chicago 30, Ill., announces production of a complete line of "See-Thru" drawer cabinets for small-parts filing and storage in factories, shops, etc.

Model J-20 consists of twenty crystal-clear lifetime-guaranteed plastic spillproof drawers, 5 1/4 in. x 2 3/4 in. x 1 7/16 in., in a welded all-steel cabinet. The cabinet has an attractive silver-gray hammer finish and is equipped with rubber feet. Adjustable drawer dividers and identification labels are included.

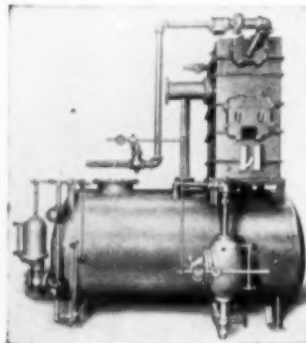
Other units now in production include models ranging from 8 to 128 drawers, models with larger size or metal drawers, and portable models with carrying handles. Over 750 combinations can be supplied.

Package Type Deaerator

B-8 COCHRANE CORPORATION, Philadelphia, Pa., manufacturers of water conditioning equipment, have announced a new line of deaerators completely factory assembled and ready for installation in a variety of storage tank sizes.

The new line of deaerators is called the UNI-PAC Deaerator, a package

Outlet capacities of Cochrane's package type deaerators range up to 60,000 lb/hr; storage tank capacities range from 35 to 250 cu ft.



type unit specially designed for small and medium size power plants.

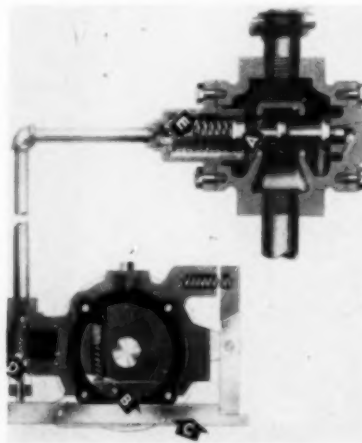
Its advantages are: Factory assembled deaerator that is easy to install by plant personnel; custom engineered features at practically stock prices; guaranteed high quality performance. All units are guaranteed to deliver water up to full rated capacity; heat water to the full temperature corresponding to the saturated steam pressure maintained within the unit; deliver deaerated water with an oxygen content not to exceed 0.005 cc per litre (generally recognized as zero oxygen).

Improved Safety Speed Stop Valve for Steam Turbines

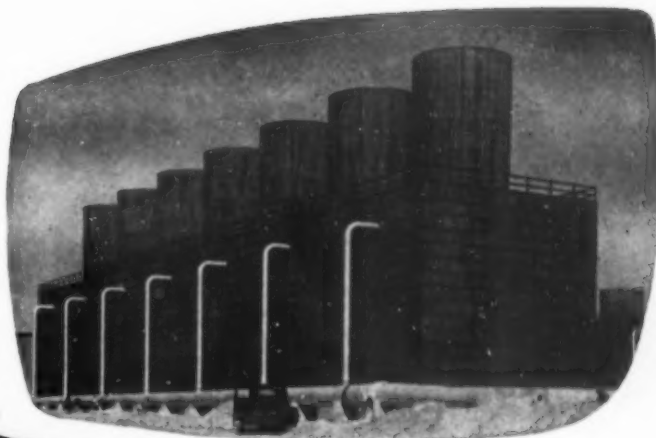
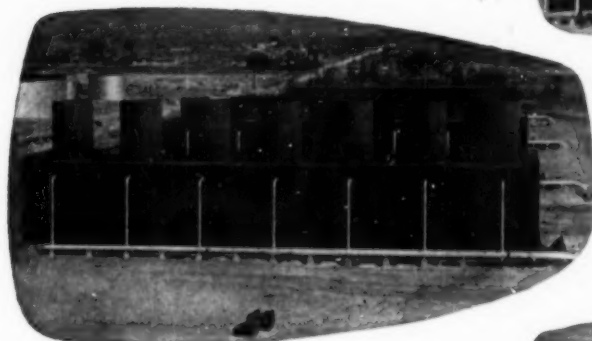
B-9 COPPUS ENGINEERING CORPORATION, Worcester, Mass., has developed a new excess speed safety stop valve for its line of steam turbines.

This improved stop valve functions entirely independently of the constant speed governor and eliminates the usual levers between safety trip mechanism and shut-off valve. The valve stem no longer protrudes outside the valve body, a new design feature that prevents stickiness due to boiler compound or other foreign matter in the steam. Complete enclosure of the valve eliminates accidental damage from outside. The new Coppus valve can be incorporated in the old style valve bodies.

When turbine is operating, Lever C is horizontal, Pilot Valve D is closed and Valve A is held open by Spring E. When excess speed is reached, centrifugal force throws Weight B against Lever C, opening Pilot Valve D. This relieves pressure back of Valve A, unbalancing and closing it immediately, compressing Spring E and shutting off the steam supply to the turbine. When Lever C is manually reset, Pilot Valve D closes, allowing pressure to build up back of Valve A and thus restoring the balance. Spring E then opens Valve, admitting steam to turbine.



FLUOR is building
the world's largest initial
cooling tower installation

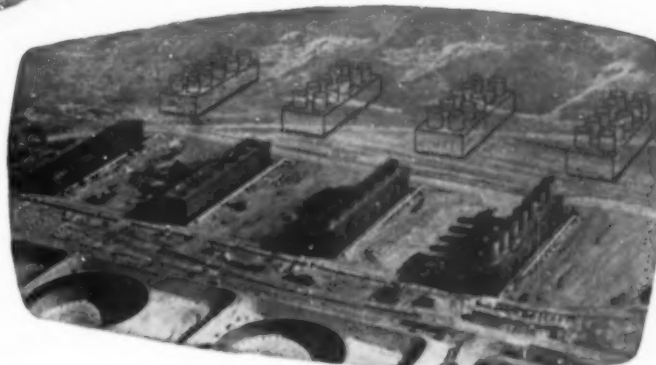


These Fluor Counterflo Cooling Towers are now being erected in the San Fernando Valley at the site of the new 512,000 KW steam-electric generating plant for the Department of Water and Power, City of Los Angeles. They comprise the largest initial cooling water circulating system utilizing cooling towers ever built.

The power plant itself is the largest initial installation inland and is being constructed in two sections. The first section consists of two units of 100,000 KW each, the second section of two units of 156,000 KW each. The four Fluor towers shown here (28 cells) in progressive stages of erection, are designed at 36,000 g.p.m. each, with a maximum of 42,000 g.p.m. They will service the first section of the plant. Design cooling range is 14° F with water entering at a temperature of 95° F and leaving at 81° F. The design wet bulb temperature is 70° F. Heat load is 1 billion B.t.u./Hr. for the first four towers.

Each cooling tower is 250 ft. long, 42 ft. wide and 37.5 ft. high to the fan deck. Twenty-foot, four-bladed fans are driven by 40 H.P. motors. Each fan moves 436,000 CFM. Capacity rating is 144,000 g.p.m. through a low pressure water distributing system. A distinctive feature of these towers is the Fluor-designed redwood stack standing 30 ft. high to minimize recirculation at peak load conditions.

Ground has been broken for the erection of four additional Fluor towers to serve the second section of the plant. Each tower will consist of 5 double-cells for a total of 40, with water circulation of 136,800 g.p.m. Design duty: inlet temperature 101° F, outlet 80° F, wet bulb 70° F. Heat load is 1,440,000,000 B.t.u./Hr. Dimension of these towers: 180 ft. long, 66 ft. wide, 45 ft. high to fan decks. Fans (18 ft.) will be driven by 40 HP motors and each will move approximately 350,000 CFM.



In addition, an auxiliary system (the bearing cooling water) employs a 4-cell Fluor Tower with a heat load of 40 million B.t.u./Hr.

When completed, total cooling water circulation will exceed 280,000 g.p.m. and will circulate over 240 miles of condenser copper tubing. Total heat load will approach 2½ billion B.t.u./Hr. The big jobs can be entrusted to Fluor, a firm with 33 years experience in the design and manufacture of cooling towers for every type of service. For complete details on Fluor Cooling Towers, write for the new illustrated bulletin, "Cooling Water for Industry."

BE SURE WITH

FLUOR

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN: FACTS FLUOR PARIS
FLUOR OF CANADA TORONTO
FLUOR INTERNATIONAL BEIRUT
FLUOR PERUVIANA S.A. LIMA
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in **LARGE** heating plants...

HOTELS,
HOSPITALS,
ETC.

DANIEL,
SCHOOLS, ETC.

or **DECENTRALIZED**
units

CYCLOTHERM
*
CYCLONIC COMBUSTION
PRODUCES MORE STEAM...
IN LESS SPACE...
AT LOWER COST!

• In multiple installations or as a single unit, a Cyclotherm steam generator is your assurance of quick, dependable steam—plus greater all-round economy.

• You get more power... Cyclotherm Cyclonic Combustion flame control required just 3 sq. ft. of heating space per Boiler Horsepower. This means your Cyclotherm delivers 66% more steam generating power per sq. ft. than ordinary steam generators of comparable size.

• Cyclotherm steam generators can be conveniently located in any building where steam is required. With only 3 sq. ft. per Boiler Horsepower your Cyclotherm saves up to $\frac{1}{3}$ the space of conventional steam generators. Installation is easier because each Cyclotherm arrives complete... connect fuel, electricity, water and a simple flue and it's ready to generate steam. Controls are fully automatic.

• A guaranteed minimum efficiency of 80% saves on fuel—gas, oil or combination—and lowers maintenance costs. Cyclotherm gives you full power from a cold start in 15 to 20 minutes. In multiple installations, an automatic battery control panel distributes the load for maximum operating economy.

• Cyclotherm steam generators are designed for 18 to 500 h.p., 15 to 200 psi operating pressures. Approved—ASME, National Board Standard, and Underwriters Laboratories, Inc.

*Reg. trade name

Find out how Cyclotherm Cyclonic Combustion will fill your steam requirements. Write for a free illustrated folder. Dept. 34



CYCLOTHERM
*
STEAM GENERATORS

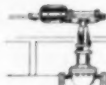
More Power to You with **PORT-A-PONY**

Everybody knows Port-A-Pony is the ideal portable power pipe threader for threading $\frac{1}{4}$ " to 4" pipe in the shop or field, but...



Did you know —

Port-A-Pony will drive low speed winches used to pull electric cable through conduit?



Did you know —

Port-A-Pony will open and close large gate valves doing the work of several men in a fraction of the time?

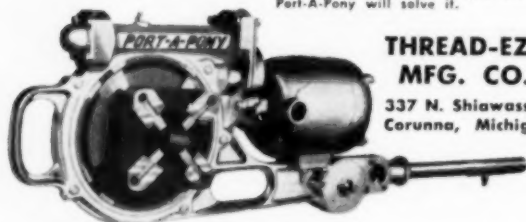


Did you know —

Port-A-Pony will drive flexible or rigid shafts replacing power take off units?

Yes, Port-A-Pony is built ruggedly with a $\frac{1}{2}$ H.P. reversible motor whose power is converted into torque by the case hardened bronze ring gear that never fails.

Send us your specific problem and we will be happy to show you how Port-A-Pony will solve it.



THREAD-EZY
MFG. CO.
337 N. Shiawassee
Corunna, Michigan

POWER
SAVINGS
Start
Here



RIGHT AT THE **SOURCE OF WASTE**

For this 15 hp motor, power losses are corrected where it does the most good—at the source. A 4 kvar Sprague Power Factor Correction Capacitor across the terminals reduced reactive circuit current flow through transformers and wiring to a bare minimum... slashed power bills noticeably.

Sprague Unit-Cell Capacitors make it unnecessary to buy even one kvar more than you need. Write for the Sprague free guide of cost-saving suggestions, No. 50B.

SPRAGUE
PIONEERS IN

SPRAGUE ELECTRIC COMPANY
49 Marshall St., North Adams, Mass.

ELECTRIC AND ELECTRONIC DEVELOPMENT

Controlled Closing Valve

B-10

SIMPLEX VALVE & METER Co., 68th and Upland Sts., Philadelphia 42, Pa., has announced the Type CCAV valve for the protection of larger size pipe lines against the damaging effects of surge and built up pressures or water hammer.

These effects may be experienced in all sizes of lines and are not necessarily confined to those of larger sizes. In the larger sizes they occur under the most unexpected conditions and, due to the intensity of their action, are capable of rupturing the line, blowing out packing, or fracturing pipe fittings and valves.

Occurrences of this kind are particularly prone to happen when large and long lines are being filled for the first time and this type of valve is particularly useful under these conditions.

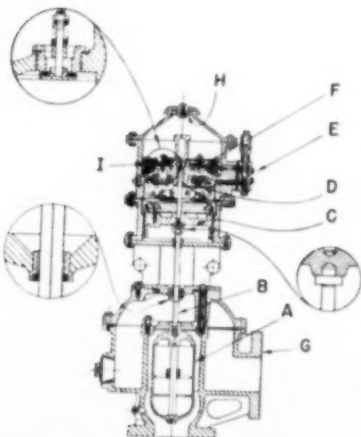
The valve is furnished with a 4 in. diameter flanged inlet opening suitable for bolting directly to a 4 in. standard flanged fitting in the pipe

Controlled closing in the Simplex valve is accomplished by the adjustment of the needle valve which regulates the flow of the retarding liquid from the lower to the upper section or storage chamber of the retarding unit.

As valve (A) begins to close, its motion is transferred by attached vertical rod (B) to block at bottom of piston (C). This is forced upward but is retarded from quick movement by retarding liquid in chamber (D).

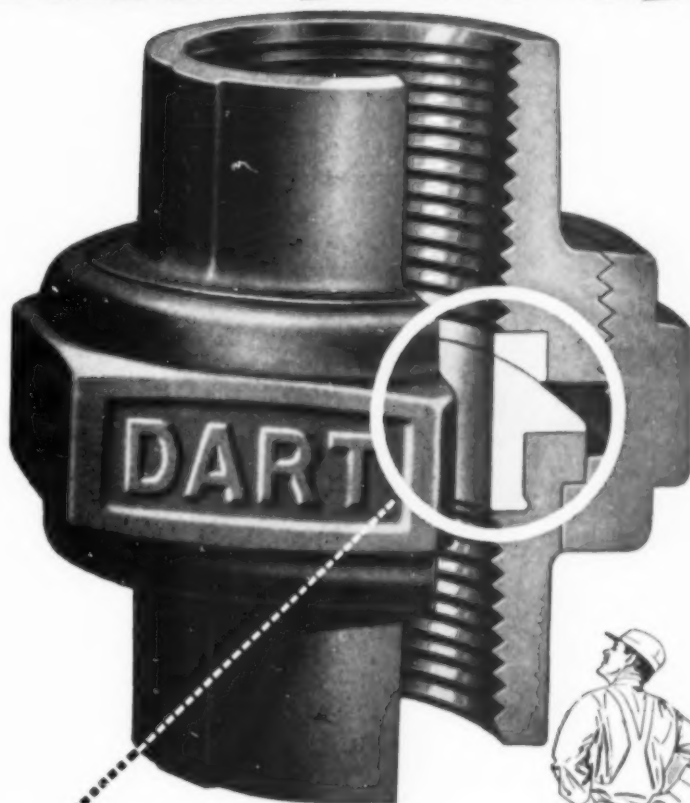
As pressure from below is increased liquid is forced through needle valve (E) into storage chamber (F). It is evident that the rate of closing of valve (A) can be regulated closely by adjustment of needle valve (E).

While valve (A) remains unseated water will be discharged through it. This water may be piped to some suitable discharge point by attaching discharge piping to flange (G).



Dart Unions are

LEAKPROOF



This True Ball Joint Makes the Difference



You can't buy an *easier-operating, longer-operating, more positive-operating* union for *any* money

QUICK FACTS

- Leakproof because precision-machined to a true ball joint and spherically ground
- Extra wide bronze seats (Resist pitting and corrosion)

- Heavy shoulders (Take severe wrenching without harm)
 - Nut and Body Practically Indestructible (They're air-refined, high test malleable iron)
- See your supplier today



DART

UNIONS

DART UNION COMPANY • PROVIDENCE 5, RHODE ISLAND
The Fairbanks Co. — Distributors: Boston • New York • Pittsburgh • Rome, Ga.

WARREN-QUIMBY

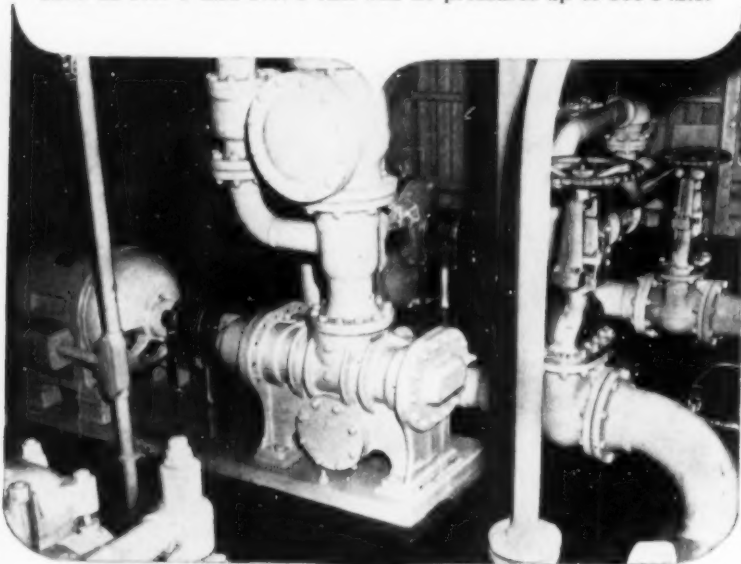
Standard Gear-In-Head Screw Pump on Fuel Oil Unloading Service at FLORIDA POWER CORPORATION

Avon Park Station

This type of Warren-Quimby Screw Pump has long been in successful service in the handling of fuel oils, lube oils and various other lubricating liquids. It is essentially a pump for high pressure applications and is available in three general types of construction:

- ① Anti-friction bearing design
- ② Anti-friction bearings with fixed center bearing
- ③ Sleeve bearing design

Also, a Long Body Gear-In-Head Pump is built for high pressures when handling light hydraulic oil and other applications for pressures up to 1000 P.S.I., and for very low viscosity liquids, such as No. 1 and No. 2 fuel oils at pressures up to 500 P.S.I.



Specify:

Warren-Quimby Screw Pumps

- First in America
- First in Dependability
- First in Preference



PQ-4

WARREN STEAM PUMP COMPANY, INC.
Warren, Massachusetts

line. A cross section of the standard unit shows the construction of the air inlet and exhaust valve enclosed by and surmounted with a cast iron shell having a suitable outlet to lead off any overflow water. Mounted upon this valve shell is a valve retarding unit, not connected to the air inflow valve, yet free to follow quickly its opening through its full stroke.

This valve retarding unit contains a piston equipped with a controller type rolling rubber diaphragm which seals in a quantity of non-freezing valve retarding liquid. In the dividing metal web of this unit are four spring loaded poppet valves held tightly closed by the upward pressure of the liquid upon them. The only access from the lower portion to the upper portion of the chamber is through the adjustable needle valve. The speed of transfer of liquid may be regulated by this valve.

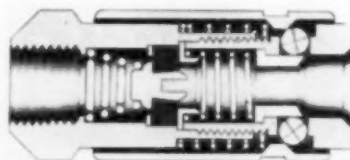
In operation, as the line is being filled with water, air contained within the pipe line is discharged and upon completion of this process the liquid enters the valve casing and attempts to float the valve to its seat. Under ordinary circumstances this would be accomplished and the line would then be sealed with no loss of water resulting. In special circumstances, where excessive surge and water hammer is expected and must be controlled, this quick closing would be defeating the purpose of the valve. The closing action must be controlled for a sufficient length of time to permit the discharge of water and the dissemination of excess water pressure with consequent reduction of water hammer and resultant damage.

This controlled closing is accomplished by the adjustment of the needle valve which regulates the flow of the retarding liquid from the lower to the upper section or storage chamber of the retarding unit.

There is no standard timing setting for the rate of closure of valve and each unit must be adjusted to suit the operating conditions at the specific point of installation.

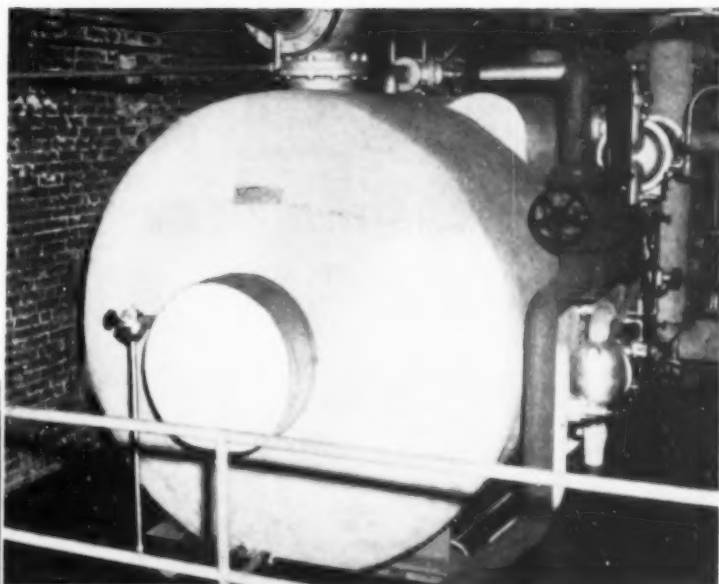
Air Coupler Design

B-11 LINCOLN ENGINEERING COMPANY, 5701 Natural Bridge Ave., St. Louis 20, Missouri, has announced a new light weight, quick-detachable air coupler,

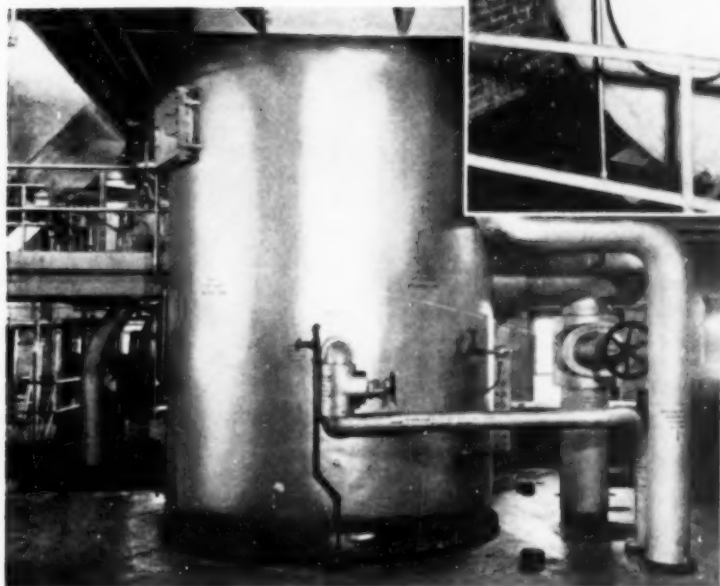


Central Station DEAERATING EQUIPMENT

by 



HORIZONTAL



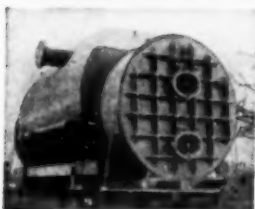
VERTICAL



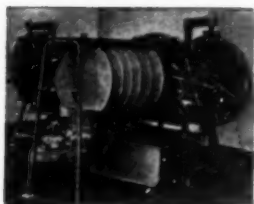
BOILERS



EVAPORATORS



CONDENSERS



REFINER FILTERS

The two units shown here are installed in the central station of a large New England public utility. Each unit represents the very latest in engineering development and was designed and built by CONSECO. They are typical examples of CONSECO'S long, specialized experience on heat transfer equipment of all kinds.

VERTICAL

This vertical tray type Deaerating Feed Water Heater delivers 588,000 lbs. water per hour at a maximum of .005 cc per liter oxygen concentration. It is fitted with vent condenser and integral storage system. It operates with extraction steam.

HORIZONTAL

The horizontal unit illustrated is a tray type Conseco Deaerating Feed Water Heater delivering 150,000 lbs. of water per hour at maximum .005 cc per liter oxygen concentration. It was designed with an internal tray section having special construction arrangements to meet requirements of limited headroom.



CLOSED HEATERS



**STEAM JET
AIR EJECTORS**

Send for illustrated literature. Ask Conseco Engineers for recommendations on condenser and heat exchanger equipment to meet your requirements and guaranteed to meet or exceed performance specifications.



Condenser Service & Engineering Co.
HOBOKEN, N. J.

--- This book may open your eyes about boiler blow-off!

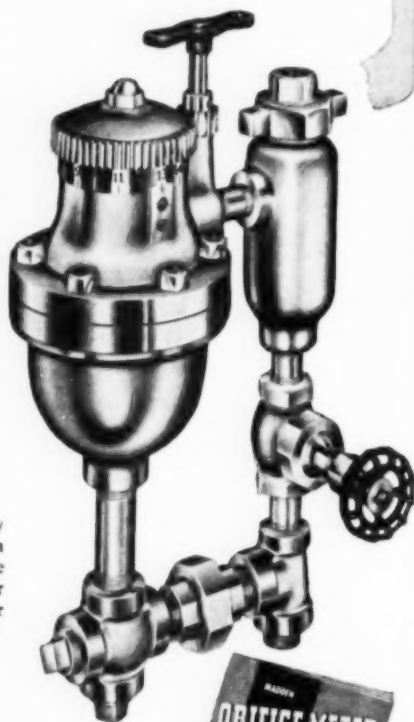
This is not just a catalog about a new blow-off valve. It's the complete story of a basically new *method* of boiler blow-down.

Authorities have long recognized that continuous blow-down was the only road to maximum efficiency and economy. Intermittent blow-down means unnecessary waste, and uncertain results.

In this book you'll read how continuous, precise blow-down has been achieved — with the Madden Orifice Meter. It answers every need, every condition. Flow control accuracy is guaranteed for 10 years. And its ability to slash heat waste means the Orifice Meter can often save its own cost in a matter of weeks.

*Send coupon
for copy today*

Learn how this soundly engineered Madden Equipment takes the guesswork out of boiler blow-off, and pays for itself in the bargain.



CHICAGO, ILLINOIS

MADDEN

ELKHART, INDIANA

THE MADDEN CORP. • 1543 Morse Ave. • Chicago 26, Ill.

Gentlemen:

Send me a copy of your book on the Madden Orifice Meter blow-off system.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

THE MADDEN CORP.
1543 Morse Ave.
Chicago 26, Ill.

which is said to offer 35% greater air flow, yet weighs only 4½ ounces.

The manufacturer states that the extra large air passage permits flow of 70 cu ft of free air per minute at 150 psi. Instantly couples, or uncouples with one push or pull. Automatic air check valve shuts off flow of air instantly when coupler is detached from nipple. Free swiveling of coupler on nipple prevents kinking of air hose.

Centralized Lubrication For Industrial Trucks

ELWELL-PARKER ELECTRIC Co., 4205 St. Clair Ave., Cleveland 3, Ohio, is now offering industrial trucks in which LINCOLN ENGINEERING COMPANY'S "Centro-Matic" centralized lubrication system is employed.

Major advantages of the system include complete and thorough lubrication of the truck in minimum time and with a minimum of effort. Starving or over-lubrication of bearings is prevented, thus increasing bearing life and reducing waste. The system permits application of grease to any number of points. An injector for each point is connected to the bearing by a tube and receives its supply of grease under pressure from the central pumping unit. Each injector measures out a prescribed amount of grease to the bearing each time pumping pressure is applied.

An adjustable knob permits varying the amount of grease sent to the bearing. The system works under a pressure of about 2500 psi. An indicator stem on each injector provides visible evidence that grease is being properly metered.

System reduces maintenance time since one man can do the job in less than 60 seconds.





TYPICAL ANACONDA JOINTING KIT contains: lead sleeve, connector, solder, flux, paper pasters, insulating and shielding tape, filling compound, flushing compound, cotton yarn and tape, waste ends—and complete instructions. The kits are easy to order by catalog number.

ANACONDA JOINTING KITS

Here's how to make sure your stockroom doesn't overlook a *single vital item* . . . and your cable-installation crews have everything they need for a specific joint.

A single forgotten item lies on the stockroom shelf miles away. Your joiner has to stop work!

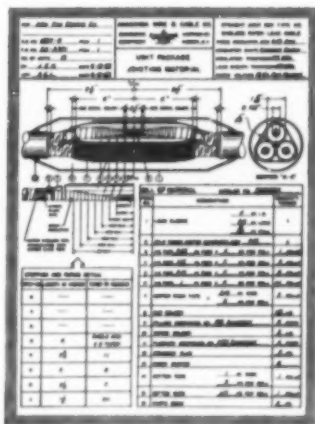
Someone grabs the wrong material in a hurry. The result is the same—wasted time and labor costs.

The remedy lies in the ANACONDA Unit Package of Jointing Material shown in the illustration above. Here in one conveniently-packaged kit is everything for one complete joint on a specific type and size of cable—impregnated-paper, varnished-cambic, rubber or thermoplastic. The kit is tailored to fit the cable perfectly.

Nothing has been left out. It's complete to a bill of materials and easy-to-follow instructions that as-

sure a neater and better job. Every item has been laboratory- and service-proven—designed by power-cable specialists.

To keep pace with the increasing demand for ANACONDA Accessories, it has been necessary again to greatly increase the facilities of the Cable Accessories Department. This Department is now in a position to promise prompt shipment on most of your orders. Your Anaconda Representative can help you select suitable accessories from our complete line of potheads, insulating compounds, jointing kits, paints, connectors, etc. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.



BILL OF MATERIAL and sketch with dimensions are included . . . a handy check-guide for proper jointing technique!

Accessories for all types and sizes of bare and insulated conductors.

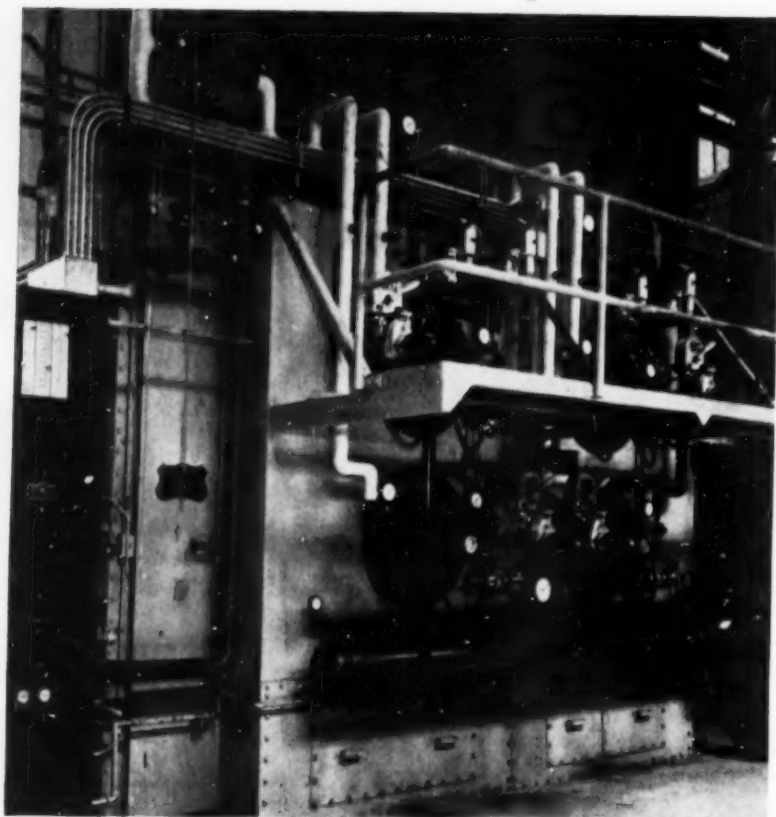
ANACONDA[®]

ENCO

GAS-OIL

BURNERS

for
LOWER
Fuel Costs



The Enco gas-oil burners in this boiler will burn oil or gas—or both. The change-over is simple and is made according to the availability or cost of these fuels. Thus the plant can avoid a shut-down when one fuel cannot be obtained, or can switch from one fuel to the other according to the relative prices or the cost per btu. Combustion is uniform with either fuel or both, even though steam demands swing sharply—another fuel-saving, money-saving feature. Other Enco burners offer similar economies for boilers of practically all sizes and types.

We invite inquiries on all burner problems—including those involving a wide range of capacities with a demand for complete atomization. We have had 35 years of experience in this field.

THE ENGINEER COMPANY

75 WEST STREET, NEW YORK 6, N. Y.

IN CANADA: ROCK UTILITIES LTD., 80 JEAN TALON ST. W., MONTREAL, P. Q.

Unit Cooled D-C Motor For Severe Atmospheres

B-13

GENERAL ELECTRIC COMPANY, Direct Current Motor and Generator Department, Schenectady 5, N. Y., has announced a new totally-enclosed unit-cooled, d-c motor for use in severe atmospheres.

The new motor was developed for application in machine-tool, paper, cement, chemical, rubber, and steel mill industries, and materials handling operations.

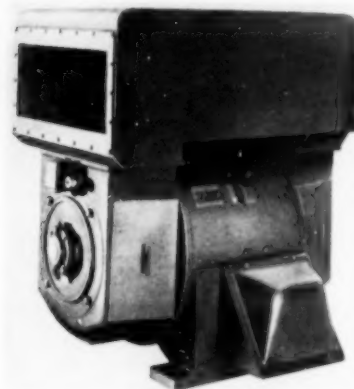
Compact cooling units permit operation at extremely low speeds for long periods of time because ventilation is independent of motor speed.

A double system of blowers assures rapid cooling. One blower assembly forces cooling air from the room through the external passages of the cooler, while the other forces internal motor air through the closed internal passages of the air cooler.

The blower motors are for 3-phase, 60-cycle power supply. The blower controller consists of a simple magnetic switch which can, at a slight additional cost, be interlocked with the main controller so that both are started simultaneously.

A thermostatic relay protects the main motor in case of blower-motor failure. Relay contacts can be arranged to cut off the main motor or sound an alarm.

Available in ratings from 15 to 200 hp, the G-E motor features 50% greater heat transfer in a 37% smaller unit than previous designs. Ventilation is independent of motor speed.



New Control Valve Line

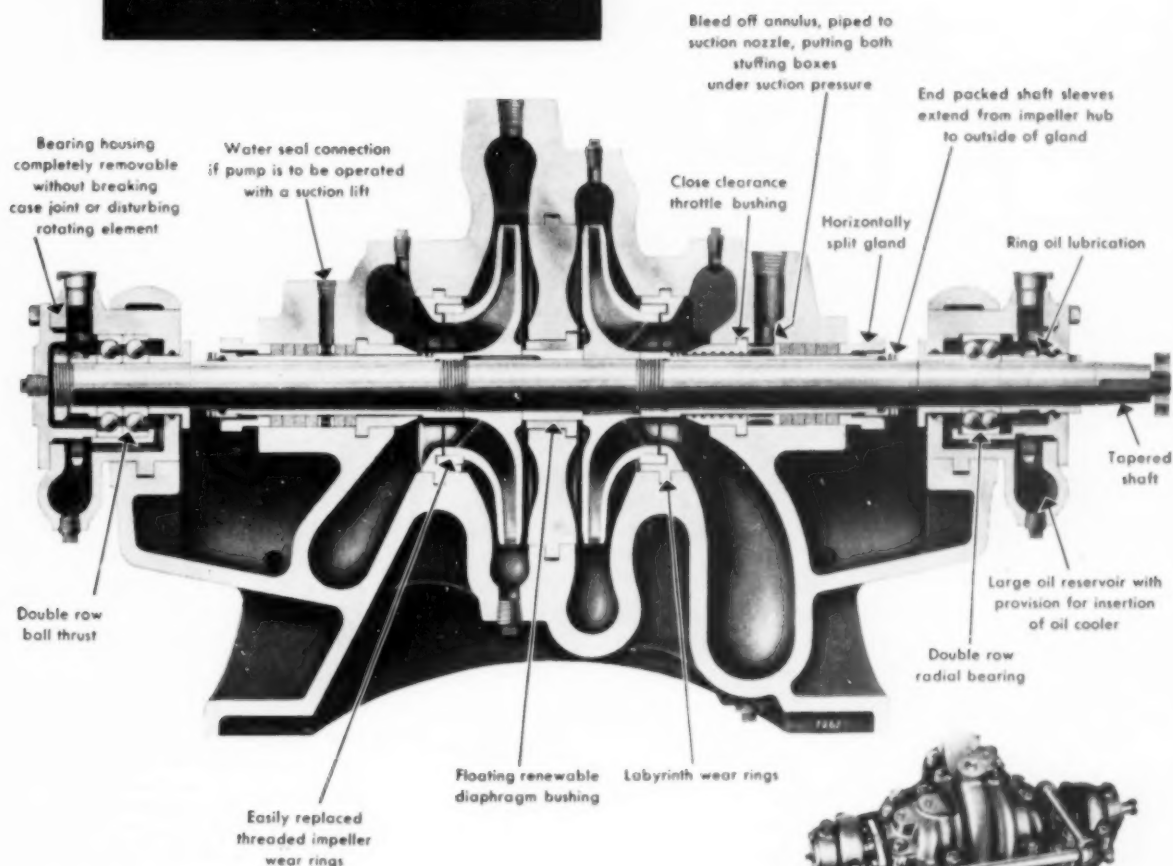
B-14

CONTROLLED FLOW VALVE COMPANY, 805 Baltimore Ave., Kansas City, Mo., has announced a new line of high capacity automatic control valves primarily designed for the safety and relief valve field but adaptable for almost

DE LAVAL

TWO-STAGE

HORIZONTAL PUMPS



These 14 Design Features Insure Long-range, Low-cost Service

Look at the important design features highlighted in this cross-section. You will clearly see why De Laval 2IS-2KS Two-Stage Horizontal Pumps are designed to give you long, dependable, highly efficient service. • These

pumps are precision-made to quality manufacturing standards. They are available in capacities from 75 to 3,000 gpm, sizes from 2" to 8" discharge and heads to 750 feet. Write for Bulletin 1501 giving complete data.



DE LAVAL Centrifugal Pumps

DE LAVAL STEAM TURBINE COMPANY

817 Nottingham Way, Trenton 2, New Jersey

DL-228

SOUTHERN POWER & INDUSTRY for FEBRUARY, 1954

117

Designed by EXPERIENCE... Proven by SERVICE

FAIRBANKS VALVES



VALUE — QUALITY — FAIRBANKS synonymous today because of the reputation achieved during a half century of progressive valve development and field service dependability.

The 0260—300 pound Bronze Gate Valve—is a typical valve, a typical value.

TWO-PIECE UNION BONNET...

Strength, quick easy disassembly, no sliding or scraping of seat between body and bonnet.

RADIAL SEAT OF UNION BONNET...

Leakproof body-bonnet joint, rigid alignment.

SOLID NICKEL ALLOY WEDGE...

guided for tight closure, corrosion resistant.

Fig. 0260 BRONZE GATE VALVE—
NON RISING STEM
300 lbs. steam working pressure at 550°F.
10264—BRONZE GATE VALVE—RISING STEM.

THE

Fairbanks

COMPANY

393 LAFAYETTE STREET • NEW YORK 3, N.Y.

Branches: New York 3 • Pittsburgh 22 • Boston 10 • Rome, Ga.

TRUCKS • CASTERS • DART & PIC UNIONS • VALVES

all liquid and vapor control services by changing only the external actuating equipment.

The basic valve utilizes a unique body design and operating principle which allows outstandingly high flow capacities under actual flow tests. It has only one moving part and uses no large springs, moving pistons, stuffing boxes or close-tolerance guides.

The valve can be opened and closed manually and automatically either at the valve or at a remote location, and can be pneumatically, hydraulically or electrically operated from a remote location. It is easily adjusted and tested. The external actuating equipment can be removed for calibration and repair or can be replaced without removing the basic valve.

Heavy Duty Wrench

B-15 SNAP-ON TOOLS CORPORATION, Kenosha, Wisconsin has available a new line of heavy duty open end wrenches that are used with detachable tubular handles.

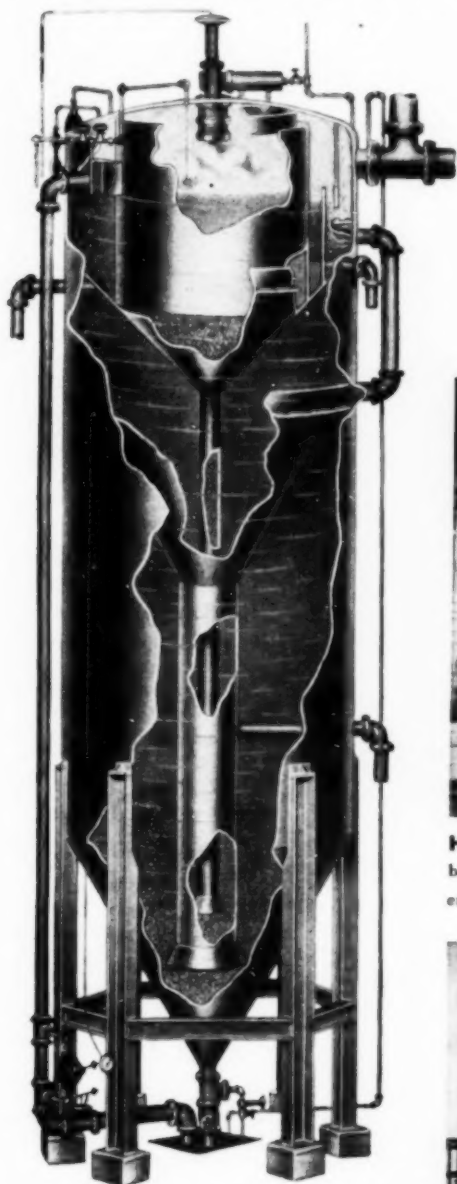
The series consists of ten wrenches with a size range of $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. Three different length handles, which fit two or more sizes of wrenches, are all that are needed to operate the complete series.

These wrenches have been designed for heavy nut turning, especially on jobs where box type wrenches cannot be used or are too slow and inconvenient. On most applications, a wrench can be used to "run-down" a nut in a hurry and only then is the tubular handle attached to give increased leverage for final tightening.

All of the wrenches have a spring mounted locking button which fits into a hole in the tubular handle to lock them securely together. As this button must be depressed with a nail or similar object, they cannot be separated accidentally.



In Hot Process Softening, too BELCO Builds a Complete Line-



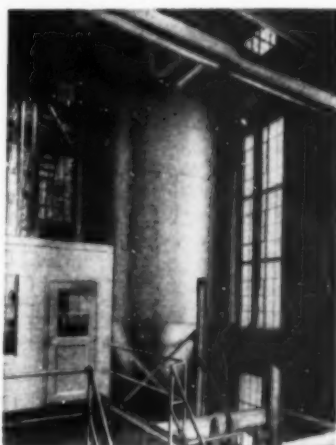
Illustrated literature "Belco In Pictures" is available on request. Write for copy, today.

Belco
*Processes for
Removal of Water Impurities*

BELCO DESIGNS, ENGINEERS & FABRICATES WATER PROCESSING EQUIPMENT

SOUTHERN POWER & INDUSTRY for FEBRUARY, 1954

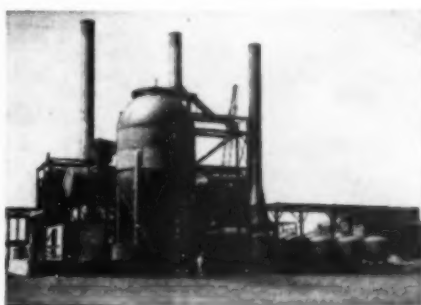
Belco-designed equipment provides high operating efficiency at low operating costs. Many of the country's largest industries rely on Belco for their water conditioning equipment. For example, Belco has built the largest fully automatic demineralization plant in the world and is currently furnishing one of the largest hot lime zeolite installations. A consultation with Belco could lead to lower operating costs for you, too. Write or call for technical assistance at any time.



HOT LIME SODA — Installation in boiler house at large eastern oil refinery. Has capacity of 200,000 lbs/hr.



HOT LIME SODA — Installation in large southwestern utility. One of three units with 90,000 lbs/hr total capacity.



HOT LIME BELCOLITE — Installation at large southern chemical company. Capacity 600,000 lbs/hr. This plant embodies "thoroughfare" operation of separate deaerator and hot process tank. The large hot process tank was designed, built and erected by Belco under its contract with customer.

Boiler Feedwater Heaters • Water Softeners • Filters • Clarifiers
Demineralizers • Automatic Process Control Panels

BELCO INDUSTRIAL EQUIPMENT DIVISION, INC.
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North Hollywood, Cal., Montreal, Que., Toronto, Ont.

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THERE'S MORE FOR YOUR MONEY · IN

PANALARM "50" ANNUNCIATOR SYSTEMS

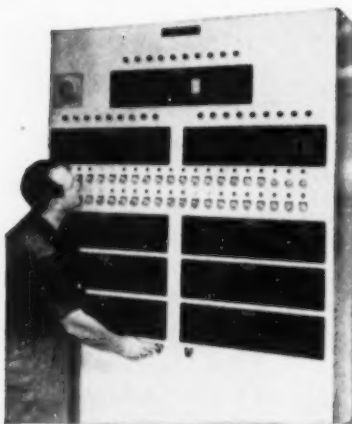
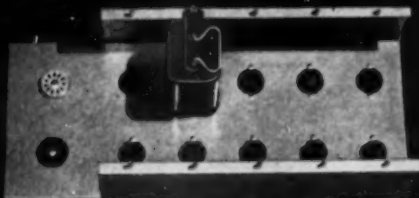
No annunciator system ever offered as much in value as PANALARM "50".

Examine for yourself every piece and component . . . consider the savings you realize through standardization and complete flexibility that only PANALARM "50" provides.

Then, evaluate *dependability*. Beyond all else, PANALARM "50" represents the greatest value in audio-visual alarm systems by its record of *dependable service* alone.

STANDARD CHASSIS

is interchangeable without re-wiring for all types of annunciator service: standard audio-visual; ringback, bullseyes or nameplates; trouble or running signals; lock-outs, or low drain operation.



PANALARM IS PROVEN!

In hundreds of plants—serving for many years—Panalarm Annunciators have demonstrated outstanding performance. They have won confidence for the very critical part they play in plant operation and safety.



PANALARM PLUG-IN UNITS

... heart of the system . . . incorporate finest telephone-type relays and special contact arrangements . . . assure sequential operation. Hermetically sealed suitable for Class I, Div. 2 locations.

SEND FOR COMPLETE MANUAL.
Ask for Catalog 100-A

PANALARM PRODUCTS, INC.

6312 North Broadway • Chicago 40, Illinois



Gai-Phone, operating exactly like a standard telephone, eliminates the need for noise-proof booths.

Telephone for Use in High Noise-Level Areas

B-16

GAI-TRONICS CORP., subsidiary of Gilbert Associates, Inc., Reading, Pa., has

announced a new electronic telephone designed for noise-free communication in extremely noisy plant areas.

This new "Gai-Phone" (pronounced "Guy" Phone) enables the user to carry on a clear telephone conversation without leaving his desk or post. It can be simply installed and mixed with conventional telephones in the same system.

Use of a special close-talking, dynamic transmitter in the handset provides a high order of discrimination against surrounding noise in addition to high quality voice transmission. It provides control of both incoming and outgoing volume level. It features controlled automatic elimination of side-tone.

Piano Hinge Apron Conveyor

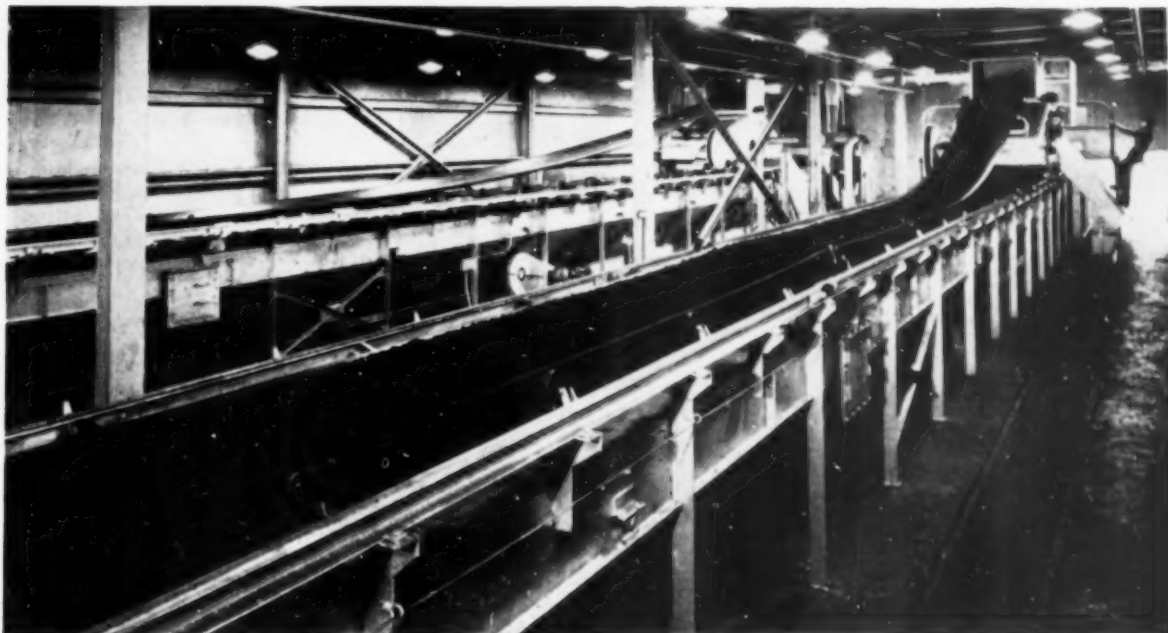
LINK-BELT COMPANY, 307 B-17 N. Michigan Ave., Chicago 1, Ill., has announced an augmented line of piano-hinged apron conveyors in three pan types, four chain pitches and four basic assem-

Piano hinges eliminate wedging effects when irregular or sharp materials are being conveyed.



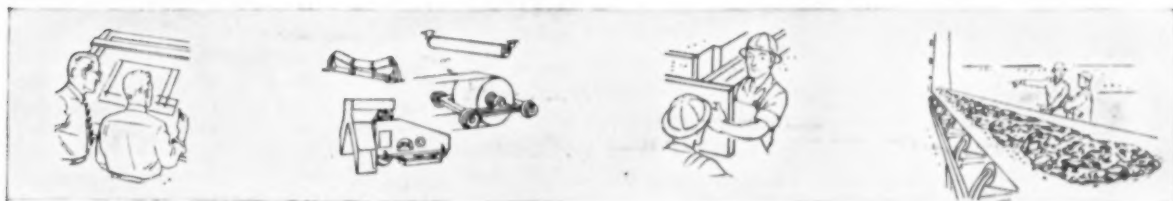
BEAT HIGH TRANSPORTATION COSTS --

carry the load via belt conveyors



Engineered for long-life in coal handling, these twin Link-Belt 36-in. wide belt conveyors employ Series 100 troughing idlers, welded steel pulleys, and self-propelled trippers with bunker seals.

LINK-BELT offers you the "total engineering" so necessary for top efficiency



DESIGNED FOR OVERALL EFFICIENCY

Because of its unrivalled experience, Link-Belt can do a better job of gathering and analyzing all data. Proposals reflect this understanding of the most practical way to fit conveyors into your system requirements.

BUILT FOR LONG- LIFE PERFORMANCE

Link-Belt manufactures all components and related feeders and conveyors. You are assured of the right equipment because of this breadth of line. And Link-Belt will supply the highest grade belts engineered to the job.

DELIVERS FULL RATED CAPACITY

Link-Belt follows through on every detail of the job, including electrical controls and even wiring and foundations. What's more, Link-Belt will furnish experienced erection superintendents, staffs and skilled crews.

ASSURES SATISFACTORY PERFORMANCE

When you rely on Link-Belt as a single source for your complete system, Link-Belt accepts responsibility for placing it in full operating readiness. We will also supervise modernization of existing systems.

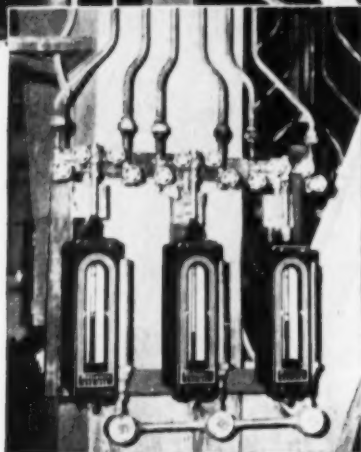
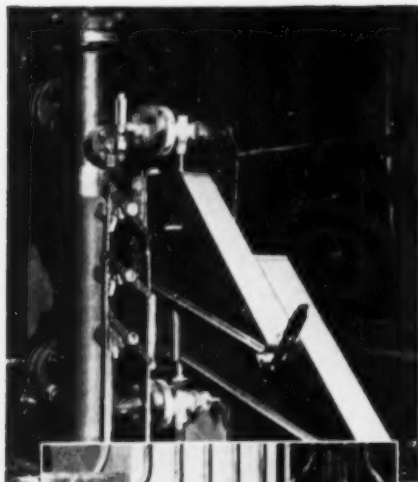
Next time you're in the market for one belt conveyor or a complete system, call a conveying expert in the Link-Belt office near you. It's his job to help you get the best in belt conveying at the lowest possible overall cost.

LINK-BELT

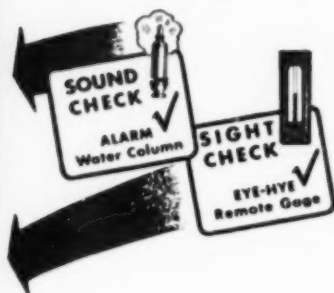
BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

IT TAKES *Double Supervision*



**to assure full
safety from
water level failure**



**Reliance Safety Team
warns operators by
SOUND and by SIGHT**

Prevent boiler outage and expensive water level accidents. Have double safety

through *double supervision* — so easy to obtain with the Reliance Safety Team. The automatic alarm water column has saved thousands of boilers from damage or explosion. Its sensitive mechanism sounds a shrill whistle or other *sound* warning the moment dangerous water levels develop.

Most operators don't want to hear that final warning so they keep tab on the gage reading. The handiest, easiest gage to read is the *eye-level* gage — the always accurate Reliance EYE-HYE Remote Reading Gage. Mount it on instrument panel or wall. Its illuminated green indicator is hard to miss.

Ask your nearest Reliance Representative about the Safety Team, or write to the factory.

THE RELIANCE GAUGE COLUMN CO., 5902 Carnegie Ave., Cleve. 3, Ohio

The name that introduced safety water columns in 1884

Reliance®

BOILER SAFETY DEVICES

For more data circle item code number
on the postage free post card—p. 17

blies, designed to meet a wide variety of conveyor applications.

The pans are interlocked at the articulation point to provide a minimum of opening and a smooth joint, and to prevent material from seeping through. The tightness of the hinges reduces tendency to wedge or pinch materials being conveyed.

Castings, stampings, scrap and chips are among the materials for which the conveyors are expressly suited. Perforated pans can be furnished for quench tank service.

Because of their tight construction and sanitary characteristics, they can be used effectively for cereals and other food products. Also, under certain conditions, they are well adapted to handling many types of coarse and granular materials, even though sharp, hot or highly abrasive.

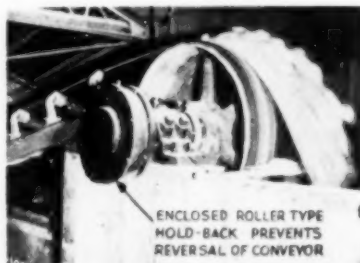
In general, these conveyors are excellent for carrying materials horizontally, up and down inclines as steep as 45 degrees, and in combination of these paths.

Roller Type Hold-Back Unit

STEPHENS - ADAMSON MFG. Co., Standard Products Division, Aurora, Ill., has introduced the enclosed roller type hold-back, designed to prevent reversal of bucket elevators and inclined conveyors due to power failure under load.

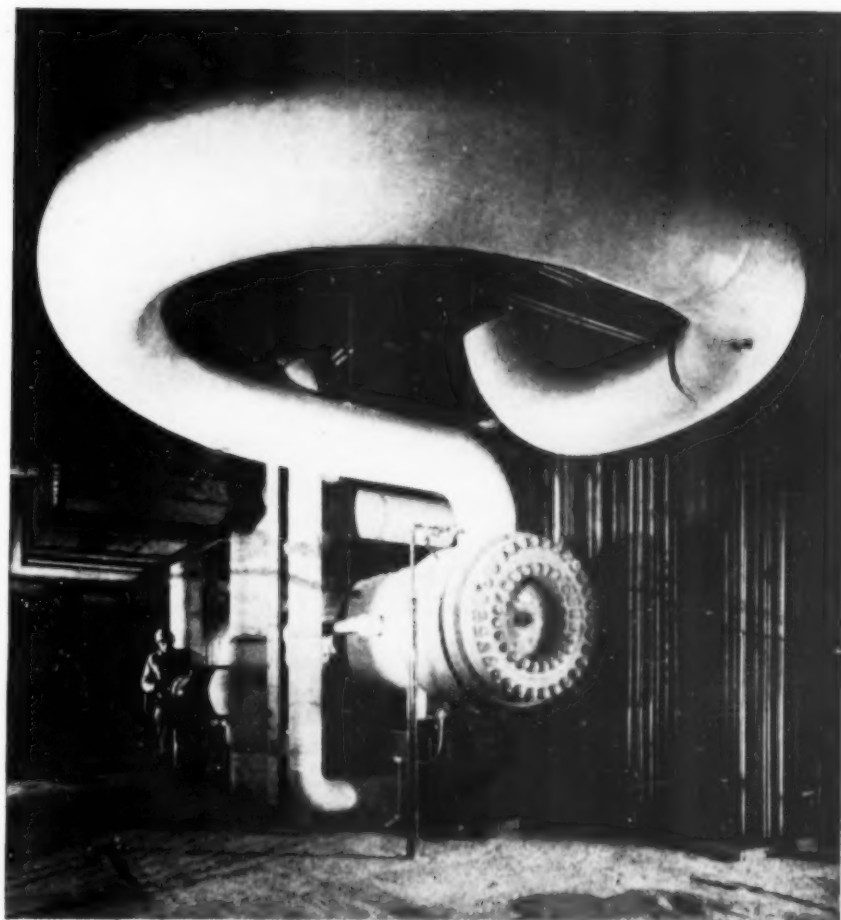
It consists of an inner member with wedge pockets for six hardened rollers, which rotates with the shaft. When the shaft attempts to reverse, the rollers wedge against an outer cylinder. Pressure springs and plungers guarantee instant engagement of the rollers. The hold-back releases instantly when forward motion of the shaft is resumed.

The hold-back mounts directly on the drive shaft, with the torque arm bolted to a support with sufficient strength to resist the load exerted when reversal occurs. Maximum torque resistance ranges up to 350,000 inch pounds for units with a maximum bore of 7 in.



ENCLOSED ROLLER TYPE
HOLD-BACK PREVENTS
REVERSAL OF CONVEYOR

This TVA
"efficiency
curve" starts
at a Lummus
feedwater
heater!



Lummus feedwater heaters contribute materially to the efficiency of the largest power-producing system in the United States—the Tennessee Valley Authority network. At key steam electric stations—like Johnsonville . . . Widow's Creek . . . Shawnee . . . Kingston . . . John Servier—a total of 160 high and low pressure Lummus heaters are in service or are scheduled for installation.

For Johnsonville alone Lummus has furnished 30 feedwater heaters for

six 112,500 KW turbine generating units. Two of the heaters incorporating 2,400 and 2,760 sq. ft. of tube surface are in low pressure service, designed for a pressure of 250 psi and a temperature of 300° F. The other three heaters, with tube surfaces ranging up to 5,707 sq. ft., are designed for a pressure of 2,500 psi, at temperatures of 450° F., 650° F., and 800° F., respectively.

Use of the patented LUMMUS MULTILOK® Closure at the chan-

nel ends of high pressure heaters, as pictured here, assures tight, trouble-free heater performance.

The association of Lummus with TVA (and with many other major power projects in the United States and abroad) is not just a coincidence . . . but springs from Lummus' engineering skill, manufacturing ability and proven product performance. That's why we urge you to call in Lummus for your next heat transfer project.



THE LUMMUS COMPANY

HEAT EXCHANGER DIVISION • 385 MADISON AVENUE, NEW YORK 17, N. Y.

Albany • Atlanta • Boston • Chicago • Cincinnati • Dallas • Denver • Detroit • East Chicago • Houston
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Steam Surface Condensers • Evaporators • Extraction Bleeder Heaters • Steam Jet Air Ejectors • Steam Jet Refrigeration
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Equipment . . Supplies . . Methods (Continued)

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

Boiler-Burner Unit

B-19

KEWANEE-ROSS CORPORATION, Kewanee, Ill., and PETRO, Cleveland 11, Ohio, have announced the new Kewanee-Petro boiler-burner unit, designed to

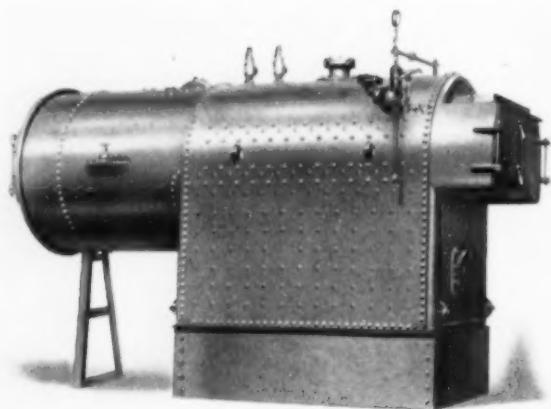
satisfy the need for a fully integrated and skillfully engineered boiler-burner combination, with wide flexibility of application.

Boiler-burner units include both steam and water models, ranging in sizes from 39 to 456 hp for high pres-

sure steam and from 1,313,000 to 15,300,000 Btu for 15 lb steam or 30 lb water. All models are available, equipped for firing No. 6 or lighter oil, or for high or low pressure gas, or for a combination of the two. With combination models, shifting from one fuel to another is quickly and easily accomplished.

The boilers, shipped direct to the job from Kewanee, Illinois, are Scotch type, pre-tested, equipped with all necessary accessories, and mounted on steel skids. Burners, shipped from Cleveland, include forced draft air supply and all combustion controls, mounted and pre-wired in one central control cabinet. The burner, controls and accessories are completely assembled and factory tested before shipment. Matching connections make it possible to attach the burner to the boiler quickly and easily. Refractories are integrally mounted at the factory.

POWER with POWER to spare



A NEW DOUBLE PASS ALL-PURPOSE INDUSTRIAL AND HEATING BOILER

SOUTHERN MADE FOR SOUTHERN TRADE

Made in sizes from 44 H.P. to 153 H.P. S.B.L. rating with pressure to 150 lbs. Designed for coal, gas or oil firing, the New Lucey Double Pass Boiler can be furnished complete as a package unit.

This boiler is in addition to our regular line of single pass fire box boilers which we have been making since 1918.

WRITE FOR BULLETIN NO. 153 FOR COMPLETE SPECIFICATIONS

LUCEY BOILER AND MANUFACTURING CORPORATION

CHATTANOOGA,
1514 CHESTNUT ST.
CHATTANOOGA

TENNESSEE
1312 STERLING BLDG.
HOUSTON, TEXAS

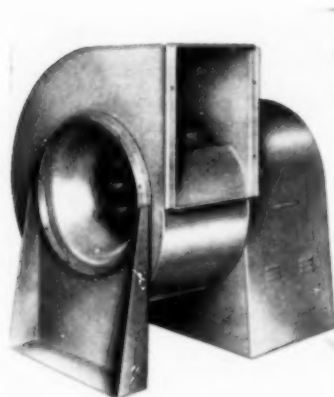
Ventilating Sets

B-20

WESTINGHOUSE ELECTRIC CORPORATION, Pittsburgh 30, Pa., is producing a new line of all-purpose ventilating sets consisting of fan, motor and drive in a single package.

In two series, a wide range of capacities are covered by the line. The "900" series is direct-drive from fan to motor, six different sizes giving an air volume range of 200 to 3200 cfm capacity. Featuring an adjustable V-belt drive, the 12 sizes of the "1000" series give capacities from 375 to 14,400 cfm. All units are powered by standard Westinghouse motors.

Where outdoor mounting is desired, weatherproof covers are available. Direction of discharge may be adjusted for ease of field installation.



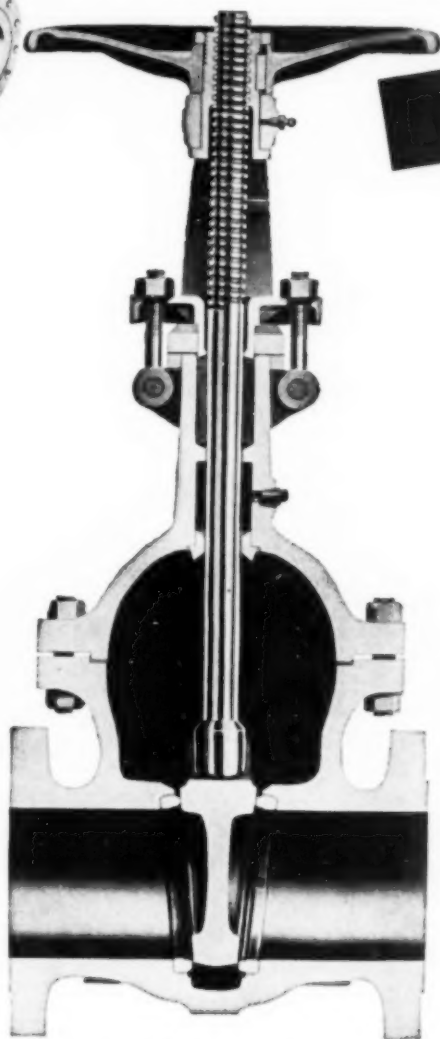
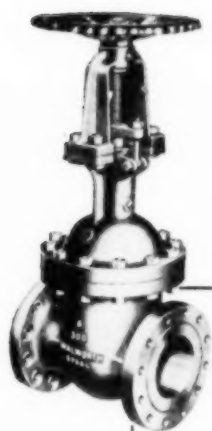
Compact designs make Westinghouse ventilating sets adaptable to unusual ventilation and exhaust problems.

WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke



Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life — costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion — they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated — not flange type. No recess exists at back of ring — hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

SOUTHERN POWER & INDUSTRY for FEBRUARY, 1954



**CALL
ATLANTIC
FOR
STEEL**

AND SERVICE YOU CAN COUNT ON!

Fast, dependable service — more than any one thing — brings us more new customers and keeps them sold. Add to superlative service one of the South's largest varieties of steel warehouse products and you have the combination that will certainly please you. When you want steel — need it in a hurry — call us and find out what service *really* means.

**24 TO 48 HOUR
DELIVERY**
Throughout the South
BY TRAIN • BY TRUCK

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Mailed regularly to keep you posted on items in stock.
To receive them, just send us name and address.



"Service in Step With Southern Progress"

WAREHOUSE DIVISION

Atlantic Steel Company

375 14TH STREET, N. W., ATLANTA, GA. • EMERSON 3451

new equipment (continued)



V. D. Anderson stainless steel float trap is designed for 300 lb pressure and maximum total temperature of 8000 F. Available in sizes $\frac{1}{2}$ " to 2".

Stainless Steel Float Trap

B-21 THE V. D. ANDERSON COMPANY, 1935 W. 96th St., Cleveland 2, Ohio, announces that a new float trap made entirely of stainless steel has been developed for draining corrosive liquids from air, gas and steam confined in piping systems and equipment.

This automatic trap drains liquids as fast as they are formed continuously without permitting the escape of air or gas. The trap mechanism consists of a valve and seat, a lever, and a ball float inside of a case—all made of stainless steel. The liquid, upon entering the unit at the top, raises the float, opening the valve, and permitting the escape of the liquid. An accumulation of any steam or gas lowers the liquid float, causing the float to drop. This action closes the valve.

Designed for 300 lb pressure and maximum total temperature of 800 F, it is made in sizes $\frac{1}{2}$ " to 2".

Heat Resistant Belting

B-22 IMPERIAL BELTING COMPANY, 1750 S. Kilbourn Ave., Chicago 23, Ill., is marketing Sahara Armored Belting, designed for long economical service in handling hot materials.

Two types are available: Insulated, for handling materials of 300 to 450 F,

SAFE CONTROL

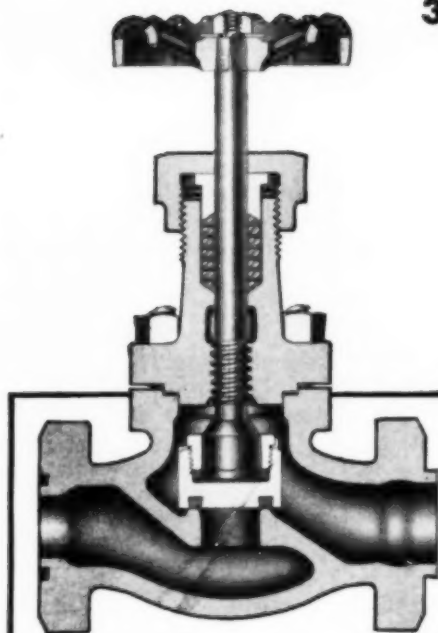
for ammonia and other
hard-to-handle fluids

CRANE

300-pound heavy-duty all-iron valves

Put these Crane valves to the test—use them for ammonia, air, oil, gas, caustic solutions, chlorinated compounds, alcohols—for chemicals and process work. Their rugged bodies of Ferrosteeel (35% stronger than cast iron)... their precision seating designs... the unusually deep stuffing box and high-grade packing... the sweeping interior body contours... assure the safety and lasting service you want.

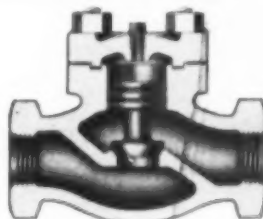
The line includes *bolted bonnet globes* and angles with choice of disc, *union bonnet globes* and angles with plug-type disc, lift checks, expansion valves, relief valves, liquid gauges—and all the fittings, flanges, return bends and other specialties for a complete Crane Quality installation. Check with your Crane man.



Cross-section bolted bonnet Globe, with flanged ends and special lead-faced disc. Sizes 1/4 to 4-inch.



Bolted bonnet Globes also available with steel disc and seat where high temperatures or corrosion prohibit use of lead.



Cross-section, Lift Check with bolted cap, and cushioned disc action which increases valve life. Sizes 1/2 to 2-inch.



New 6-page folder AD1977 catalogs this complete Crane line. Write direct, or ask your Crane Representative.

THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas



for the
**THRIFTY
BUYER**

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

YOU PAY for bad air!



Here are two authoritative catalogs that will help you get rid of hot, stagnant air and disagreeable odors... the kind that cost you in terms of employe efficiency and customer relationships.

These catalogs include plans for

effective fan installations in stores, offices, factories and institutions, plus information on dependable Emerson-Electric Exhaust Fans and Air Circulators.

Make air an asset, not a problem. Send for these free catalogs today!

THE EMERSON ELECTRIC MFG. CO.
St. Louis 21, Missouri

The Emerson Electric Mfg. Co., St. Louis 21, Mo.

FREE — Without obligation, send me the Emerson-Electric Catalog(s) checked:

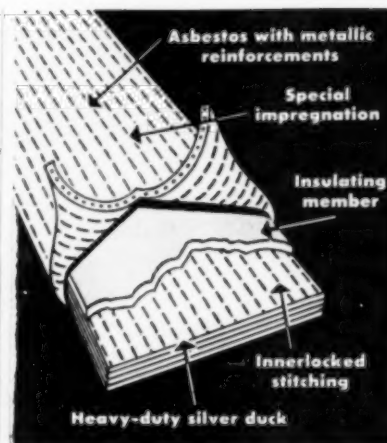
No. 756-A Exhaust Fans

No. 756-B Air Circulators

Name Title

Company

Address City State



Imperial's armored heat resistant belting.

and Super Insulated for 450 to 600 F.

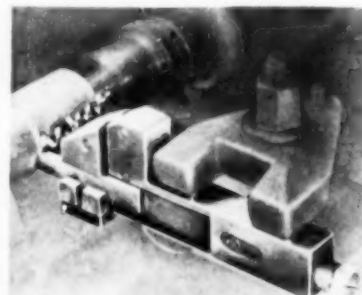
In these belts, wire is spun together with asbestos fibres in the outer ply. This tough reinforcement, combined with a surface hardening treatment, gives greater strength and resistance to impact damage as well as to sharp cutting edges that tear and scrape belt surfaces. Core material is heavy, tight-woven silver duck with tensile strength over 750 lb per in. of width. Inner-locked stitches prevent ply separation.

These new armored belts are particularly suited to carrying hot foundry castings and shakeout sand. Their asbestos content permits handling even red-hot lumps without damage to the belt.

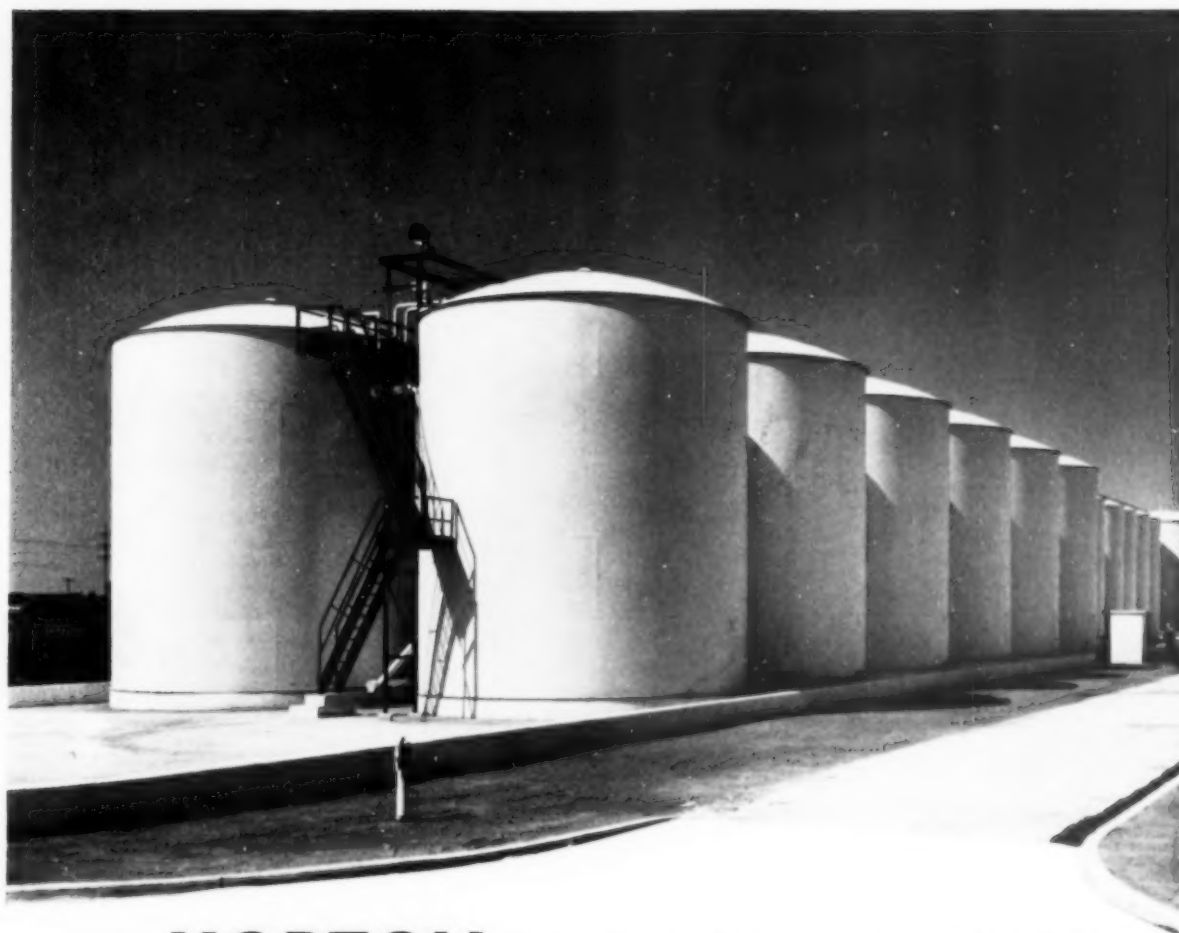
Tool Holder Design

B-23 THE AMERICAN TOOLING CORPORATION, 60 E. 42nd St., New York, N. Y., announces a new tool holder which absorbs vibrations and shocks occurring when turning rough surfaces or other

All shocks and vibrations are transmitted to a rubber spring pack located inside the shaft. Spring pack's ability to absorb vibration and shocks can be regulated by adjusting a stop-bolt at end of the Recoiler shaft.



ANIMAL, MINERAL OR VEGETABLE . . .



IT'S HORTON TANKS FOR OIL STORAGE

Chicago Bridge & Iron Company's engineering, fabricating and construction departments are equipped to build welded steel plate tanks of any size, shape or form to store animal, mineral or vegetable oil . . . or any other liquid or chemical.

Special construction and exacting specifications offer no obstacles. We have complete facilities for erecting structures built of carbon steel or non-corrosive metals and for stress-relieving and X-raying shop-built structures. All of our four plants are equipped to pickle and paint fabricated steel plates by the Horton phosphoric acid process.

When planning flat-bottom storage tanks, elevated water tanks, standpipes, or any type of welded steel plate work, write our nearest office for information, estimates or quotations. There is no obligation on your part.

The view above shows some of the 42 tanks we built for the Southern Cotton Oil Company in Chicago, Illinois. Used to store vegetable oil, they are typical examples of smoothly welded, easily maintained Horton steel tanks.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3 2180 Healey Bldg.
Birmingham 1 1531 North Fifth St.
Boston 10 1044—201 Devonshire St.
Chicago 4 2107 McCormick Bldg.
Cleveland 15 2218 Midland Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.

Detroit 26 1534 Lafayette Bldg.
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Los Angeles 17 1545 General Petroleum Bldg.
New York 6 3312—165 Broadway Bldg.
Philadelphia 3 1646—1700 Walnut St. Bldg.

Pittsburgh 19 3252 Alcoa Bldg.
Salt Lake City 4 545 West 17th South St.
San Francisco 4 1531—200 Bush St.
Seattle 1 1345 Henry Bldg.
Tulsa 3 1628 Hunt Bldg.

In Canada—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

Okadee "THE PERFECT SEAL" WRING FIT

VALVE
DISC
VALVE
SEAT

No magic... No magnetism... lapped wring fit of every Okadee Valve disc and seat must pass this test of a perfect sealing surface. (unretouched photo)

... Here's What it Means to You in Terms of Valve Service

Flat mating surfaces within .000005", or less, of every set of Okadee valve discs and seats mean absolute shut-off of any material from ammonia gas to asphalt.

How long does this seal last in service? We honestly don't know. Tests under working conditions with propane were stopped after 269,000 operating cycles when no wear or seal failure could be detected. And Okadee valves do not have to be babied in service on corrosive or abrasive materials... Thousands of boilers have had Okadee blow-down valves in continuous, trouble-free service for fifteen years or more. If Okadee size-pressure-temperature ranges include your valve applications, Okadee installation will end your problems of valve performance once and for all.

Okadee valves are available in single-disc (one direction) and double-disc (two directions) types; screwed or flanged; ½" to 6" in standard A.S.A. dimensions; steel or semi-steel bodies (other materials to order); stainless steel or stellite seat facings; levers, rack-and-lever, worm-gear, hydraulic, pneumatic, automatic on-off control.

Write for Bulletin 332-H today!

OKd.

Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

than round work. In addition to absorbing shocks, the tool holder maintains a constant cutting angle.

Known as the "Recoiler," the device prevents breakage of bits, prolongs cutting tool life, and permits higher machine tool speeds.

Because of the shock absorbing action, carbide bits can be used in applications which would break these same bits if held in a rigid tool holder.

The head of the "Recoiler" is connected to the body by a specially designed linkage which holds the cutting tool at a constant angle.

Self-Adjusting Joint

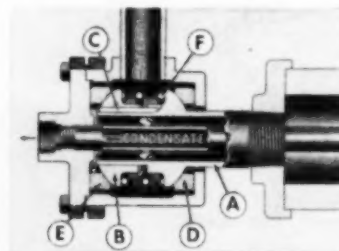
JOHNSON CORPORATION, B-24 Three Rivers, Mich., has introduced the new Series 2000 Type J joint featuring less weight, smaller size, lower price and longer life for the wearing parts.

These joints are designed for admitting steam or fluids into the rotating rolls and cylinders of paper, textile, rubber and similar machines, and are available in the through flow type—which calls for location of a joint at each end of roll—or syphon pipe type, which has both the inlet and outlet connections housed in the same joint. On the syphon pipe models the head design has been simplified to one standard design which permits syphon pipe connection in any direction.

The new joint is completely packless and self-adjusting. There is a flexibility to provide for lateral and angular misalignment.

Arrows show how steam enters the Type J Johnson Joint through inlet in body, passes through ports into the nipple and then into the roll or cylinder. Condensate is removed through the head.

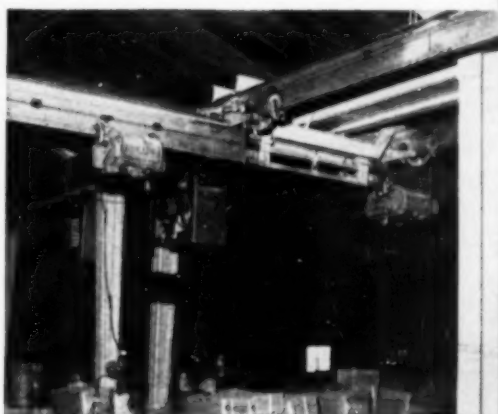
The rotating member consists primarily of just two parts—the nipple (A) and the thrust collar (B) which slides freely endwise over the nipple but is keyed to it at (C). Both of these parts have convex hemispherical surfaces as shown, which rotate against the matching concave surfaces of two special carbon graphite rings (D) and (E). The spring (F) maintains an initial seating pressure against these two rings, but the actual sealing force is the pressure within the joint, which forces the seal ring (D) against the nipple; the higher the pressure, the tighter the seal. The ring (E) serves as a bearing for the thrust collar.



for smooth operation at low maintenance cost use.....

AMERICAN MONORAIL CRANES

Three-ton hoist hook service extends from crane way to crane way by finger-tip controlled passage of carrier across crossover with cranes interlocked at each end.



One-ton hoist operated from crane bridge to crane bridge interlocked at crossover between crane ways.

Three MonoRail cranes are interlocked to form passageway for transfer from receiving dock to steel storage area. Crane in foreground interlocks with spur track to each shear.



To handle variable loads over maximum areas, MonoRail Cranes offer smooth travel, easy movement, interlocking service between and beyond crane ways, low initial cost and most

important low maintenance cost. American MonoRail engineers are experienced in all phases of "up and over" handling. They are available for free consultation at your convenience.



Write for C-1 Bulletin

AMERICAN

OVERHEAD
HANDLING
EQUIPMENT

MonoRail

COMPANY

13105 ATHENS AVENUE • CLEVELAND 7, OHIO

NEW from Garlock!



All Teflon[†] Yarn LATTICE BRAID* PACKING

For Service Against the Most Destructive and Corrosive Acids on Pump Shafts and Valve Stems

This new Teflon packing is *not* just another braided packing made from Teflon ribbon. It is a *totally* different packing made from an all-new Teflon yarn. The yarn is woven tightly by the patented LATTICE BRAID method into a relatively dense, firm braid with no large voids. Garlock can furnish Teflon yarn packings in two styles—

No. 5883 LATTICE BRAID packing—composed 100% of Teflon yarn.

No. 5888 LATTICE BRAID packing—composed of 100% Teflon yarn and treated with Teflon suspensoid.

They are furnished in coil and ring form in sizes $\frac{1}{8}$ " to $1\frac{1}{2}$ ". Both packings are superior to any other types of braided Teflon packings for service against the *most* destructive or corrosive acids at high pressures and temperatures up to 500° F. For example, note this service report—

Duplex pump, $1\frac{1}{8}$ " shaft, $\frac{3}{8}$ " packing size, pumping sulfuric acid at 12,000 p.s.i. New Teflon yarn packing was installed. Customer reports that *after 1,000 hours* they added 2 rings and are still operating. (Best prior service was 330 hours with a blue asbestos braided packing with Teflon suspensoid.)

Contact a Garlock representative at the sales office nearest you. Get his recommendations on the new Teflon yarn packings and on other Garlock Teflon products.

THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

Branch Offices: Baltimore • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • New Orleans • New York City • Palmyra (N.Y.) • Philadelphia • Pittsburgh • Portland (Ore.) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa

In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

*Registered Trademark. †Du Pont's Trademark for its tetrafluoroethylene resin.

GARLOCK

**PACKINGS, GASKETS, OIL SEALS
MECHANICAL SEALS
RUBBER EXPANSION JOINTS**

new equipment (continued)

For more data circle item code number on the postage free post card — P. 17

Globe Valve

B-25 RICHMOND FOUNDRY AND MANUFACTURING COMPANY, Richmond, Virginia, is now producing a new and improved version of its Ostalind Valve, which has been rechristened the "Gyroseal" Valve.

The new valves are designed to eliminate causes of valve failure by causing the disc to rotate rapidly at the moment of closure. Foreign particles are thrown off by centrifugal force and the turbulence created keeps the particles in suspension while the disc is gently polished against the seat.

Far stronger yet simpler in construction than the original valves having this feature, Gyroseal valves are said to last longer, need less repair, and are simple to repack. They cut downtime by eliminating leakage, unbalanced flow, spalling, wire drawing, chattering, sticking and the necessity for regrounding or replacing disc and seat.

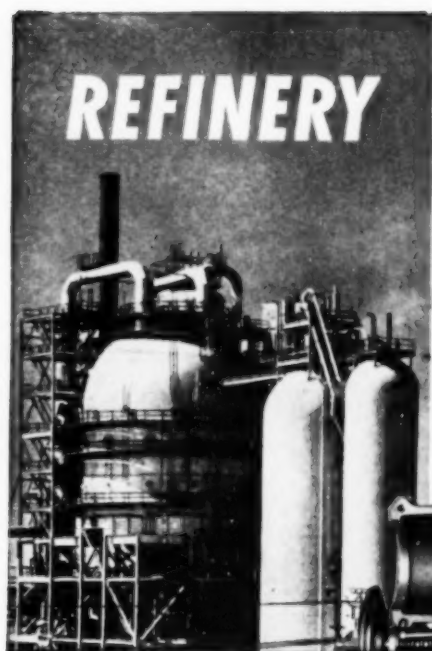
High Capacity Chlorinators

B-26 FISCHER & PORTER COMPANY, Hatboro, Pa., announces a new line of high capacity chlorinators which can handle up to 6000 ppd with either manual or automatic proportioning.

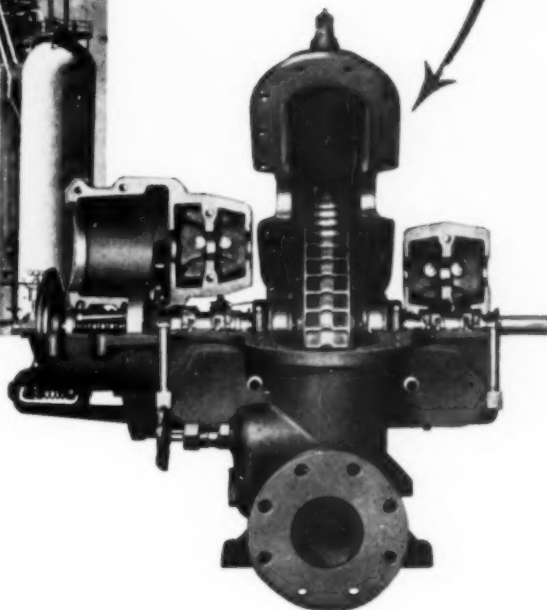
The Figure 1052 Ratachlor chlorinators are designed about an all-vacuum, solution feed system. A direct reading flow meter enables the operator to spot any change in chlorine flow rate the instant there is an adjustment in chlorine rate valve.

Vacuum created by the water ejector insures positive, direct flow of chlorine through the chlorinator system. Pressure of dry chlorine gas entering the system is reduced to 20 in. water column vacuum by the vacuum regulator before passing through a Flowrator meter. Chlorine next goes through the rate valve which can be maintained at desired setting by direct or remote means. Flow through the valve is kept constant by a differential pressure regulator. In the ejector assembly, gas is mixed with water and the solution goes on to the point of injection.

Standard capacities of the equipment range from 100 to 1500 ppd up to a range of 500 to 6000 ppd, and capacity range of any one instrument can be extended by interchanging flow meters.



has 101 ways to save money



When the yearly cost of replacement parts for 101 steam turbines averages *only 1.6% of the initial investment*, you are saving money . . . and plenty of it.

This amazing record was established by Terry turbines at a large refinery on the Atlantic coast. The percentage figure was determined by means of an accurate tabulation of the cost of replacement parts required over a two-year period.

These 101 Terry machines provide a good cross section of the various types of small and medium-size turbines made by the company. Ranging in size from 10 to 1200 horsepower,

they include single and multistage axial flow designs as well as the famous Terry solid-wheel turbine.

Such outstanding performance records are not at all unusual for Terry turbines. The thousands and thousands of these machines installed in refineries throughout the world provide an accurate yardstick for measuring turbine reliability.

Send for illustrated bulletins. No. S-116 describes the many advantages of the Terry solid-wheel turbine. For multi-stage turbines, ask for a copy of Bulletin S-146.

TERRY

THE TERRY STEAM TURBINE CO.
TERRY SQUARE, HARTFORD 1, CONN.

"Electricity and Electrical Power"

**Basic information on the fundamentals of electricity
for the first time available in ONE Volume!**

A limited edition of this important handbook has just been printed and is available to subscribers to SOUTHERN POWER AND INDUSTRY only. Order your copy NOW with a new or renewal subscription to this magazine.

A series of seven articles, "Electricity and Electrical Power" by Roy W. Wages, industrial engineer for Georgia Power Company, was published last year in SOUTHERN POWER AND INDUSTRY and received wide attention and favorable comment from plant engineers in the South and Southwest.

Demands for reprints of this series became so great that we have had all the articles bound in one volume. This useful 72-page book is now available to SOUTHERN POWER AND INDUSTRY subscribers exclusively.

In simple, practical terms, Mr. Wages makes clear the mysteries of electricity all the way from ex-

plaining and defining a volt to a discussion of the sine curve of alternating current motors. The book is liberally illustrated with diagrams and pictures which help make the text crystal clear. Throughout the pages, the author does everything possible to simplify the presentation of facts for easy study and understanding.

Here is a book you will want to keep for reference and for training periods. Pocket sized, it is convenient to carry anywhere . . . for checking right on the job.

All you have to do to own this valuable booklet is to check the coupon below now, and send it back to us. For three dollars, you get a three-year subscription to SOUTHERN POWER AND INDUSTRY plus "Electricity and Electrical Power"!

The editors will welcome you into the growing family of SOUTHERN POWER AND INDUSTRY readers.

Yes!

I accept your invitation. You may enter my 3-year-subscription to SOUTHERN POWER AND INDUSTRY and send me my personal copy of Electricity and Electrical Power at the special combination rate of \$3.00.

☐ Enclosed find \$3.00

☐ Send bill for \$3.00

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CLASSIFICATION DATA

If an individual give name of firm connected with and title of position.

Firm Position

Products manufactured
or nature of business

Enclose coupon with remittance. If you want to be billed, send coupon alone.

SOUTHERN POWER & INDUSTRY

806 Peachtree Street N.E.

Atlanta 5, Georgia

news (continued)



F. Doyle Bowers

Republic Rubber—S.E.

F. DOYLE BOWERS has been appointed Southern District Manager for the REPUBLIC RUBBER DIVISION, LEE RUBBER AND TIRE CORPORATION, Youngstown, Ohio.

In his new position Mr. Bowers will be responsible for the operation of the Southern District Office in ATLANTA and for the supervision of field representatives in Jackson, Mississippi; Chattanooga, Tennessee and Columbia, South Carolina.

Bowers joined Republic in 1943 after many years of experience in the Mill Supply business with distributors in Memphis, Shreveport and Greensboro. Since 1943, he has been a field representative for Republic with headquarters in Chattanooga.

Shell Chemical Corp.—La.

THE FLUOR CORPORATION has been selected as engineer contractor for the new NORCO, LOUISIANA plant of SHELL CHEMICAL CORPORATION, with work scheduled to start immediately and completion expected late in 1954.

The Norco plant will produce allyl chloride and chlorohydrins. It is the first step in Shell Chemical's current glycerin expansion program.

R. K. WALTERS, recently appointed a senior engineer in Shell Chemical's head office, had been made construction superintendent. He will be assisted by E. P. FRANZEN, project engineer, process; and K. O. McDONALD, project engineer, off-site. C. C. BROTHERS has been made assistant to the construction superintendent.

Roylyn Opens Atlanta Office

ROYLYN, INCORPORATED, Glendale 1, Calif., has recently opened a sales office at 267 E. Paces Ferry Road, ATLANTA, GEORGIA. KENDALL P. DANE heads the new office as Southeastern Sales Representative.



fabricated and erected
by Blaw-Knox

high pressure tunnel piping system

... in large steel mill

You may sometime have the problem of installing a complex piping system in a confined space, like this one. Or your problem may be even more difficult . . . or relatively simple. But whatever it is, we have the experience and facilities to handle the entire job. Always, of course, in close cooperation with your consultants or your own organization.

In our organization you'll have the benefit of a group of engineers who can help you solve problems that involve piping.

You'll have modern shop facilities for hot and cold bending, welding and fabricating all types of piping. A metallurgical research laboratory to assure you of the latest developments in high pressure, high temperature piping. The most modern testing equipment to insure that the piping is

sound and sturdy enough to withstand the most severe operating conditions.

Plus a complete service force equipped with modern machinery for field work and erection . . . and the necessary manpower to handle any size job.

What kind of service would you want?

We are prepared to (1) engineer, fabricate and erect your job . . . or (2) simply fabricate and erect . . . or (3) fabricate only.

Our engineers will quote from your drawings . . . or, where desired, make a field study of your piping requirements before quoting.

Just tell us your service requirements . . . and we'll provide them.

BLAW-KNOX COMPANY

Power Piping and Sprinkler Division
Pittsburgh 33, Pa.



To get more information
on piping for industry write
for your copy of Bulletin
No. 2443.



POWER PIPING

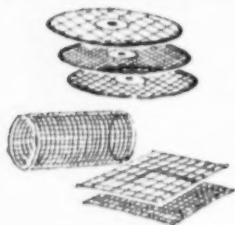
Complete prefabricated power piping systems for all pressures and temperatures . . . plus complete line of functional hangers • rigid hanger assemblies • overhead roller assemblies • supports • vibration eliminators

your **WIRE CLOTH** needs
may be in stock at
CAMBRIDGE



Supplies of many of the most frequently used types of industrial wire cloth are kept in our warehouse ready for immediate shipment to you. And even if the type you use is not in stock, we can schedule our looms to have your material in your plant without delay. Any metal or alloy; sizes range from 20 x 250 mesh up to 4" openings...and accurate mesh count is our pride.

also **FABRICATED PARTS**



Filter leaves, strainers, sizing screens, etc. We can fabricate most any type of part you need, in any quantity. We'll work from your own prints or, if none are available, our Engineering Department will draw up prints from your description of what the part must do. Once you've O.K.'d them, we'll start production.

Why not have us quote on your next order for wire cloth in bulk or fabricated parts? Write direct or call in your Cambridge field engineer. He's listed under "Wire Cloth" in your classified telephone directory.

FREE CATALOG gives full range of wire cloth available, also shows fabrication facilities and includes valuable metallurgical data. Write for your copy today.



The Cambridge Wire Cloth Co.

WIRE
CLOTH

METAL
CONVEYOR
BELTS

SPECIAL
METAL
FABRICATIONS

Department Y
Cambridge 2,
Maryland

OFFICES IN LEADING INDUSTRIAL AREAS



Lee E. Cearnal



Carl L. Noe

William Powell Co. Names Southern Representatives

LEE E. CEARNAL, JACKSONVILLE, FLORIDA, has been appointed sales representative of Powell Valves, for THE WILLIAM POWELL COMPANY, Cincinnati, Ohio. Mr. Cearnal will service industry throughout the southern part of Georgia and South Carolina, and all of Florida, except the area west of the Appalachian River.

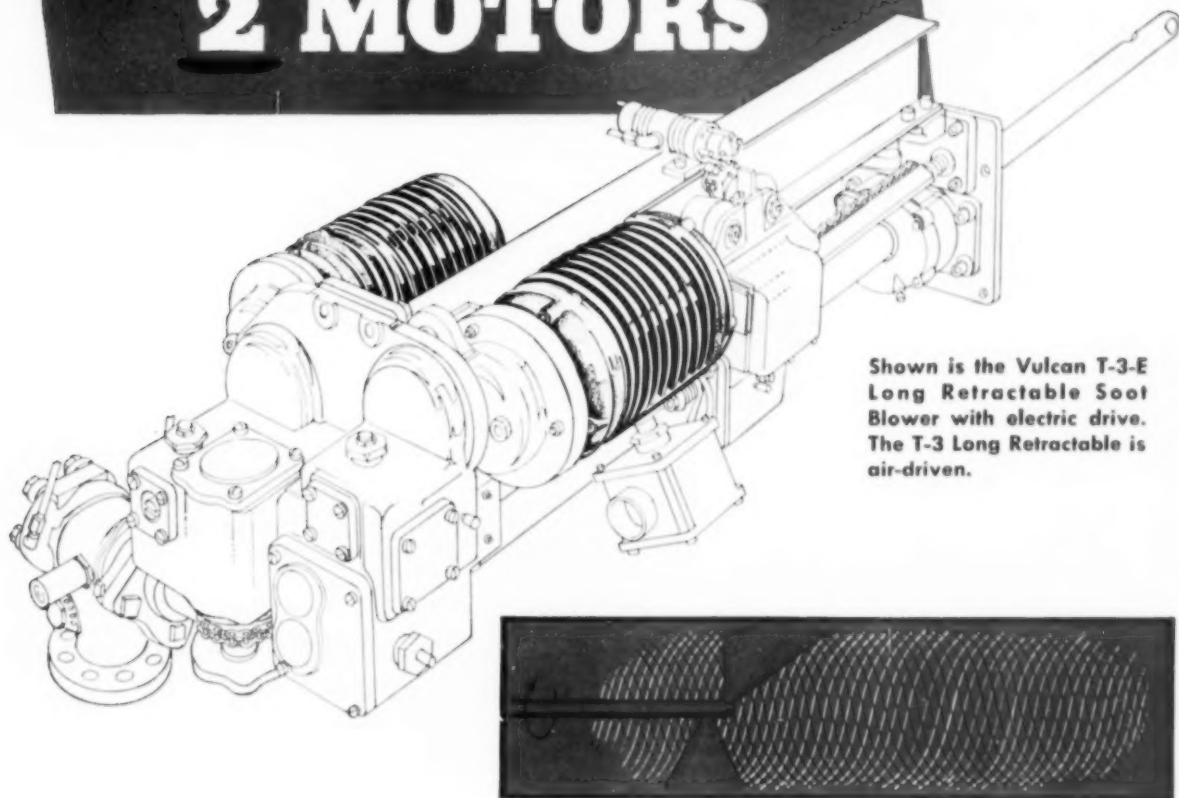
CARL L. NOE has been appointed representative for the company in southern Alabama, Mississippi, and part of Florida. His headquarters are in MOBILE, ALABAMA.

Vulcan Steel Container Co. Appoints Mitchell—Alabama

Appointment of RAY I. MITCHELL as Sales-Service Representative for VULCAN STEEL CONTAINER CO., BIRMINGHAM, ALABAMA has been announced by Gordon D. Zuck, President.

Mitchell is a graduate of the University of Alabama. He served in the Navy during World War II, and has been doing special sales work since. He will have headquarters at the company's main offices and plant in Birmingham and will contact users of steel pails and drums throughout the South as a special representative.

why **VULCAN** uses **2 MOTORS**



Shown is the Vulcan T-3-E Long Retractable Soot Blower with electric drive. The T-3 Long Retractable is air-driven.

THIS CLEANING PATTERN—an infinite number of double-helix paths—makes the second motor of a Vulcan Long Retractable Soot Blower a most profitable investment. Two motors cost more—but they are worth more.

To get such thorough cleaning—with the blowing steam or air always cleaning a new path—you must have two motors. One motor moves the lance in and out—the other rotates it. And with the two motors, traversing and rotating speeds are independently adjustable for your exact needs.

This double-helix pattern cuts tube replacement

costs. There is no danger of the blowing medium constantly striking—and wearing away—the same part of each tube. Packing life is increased.

These are reasons why Vulcan "Long Retracts" are found on so many new high-duty boilers. Users know Vulcans pay for themselves quickly and often. The story is told in Bulletin 1002. Write for it.

COPES-VULCAN DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
ERIE 4, PENNSYLVANIA

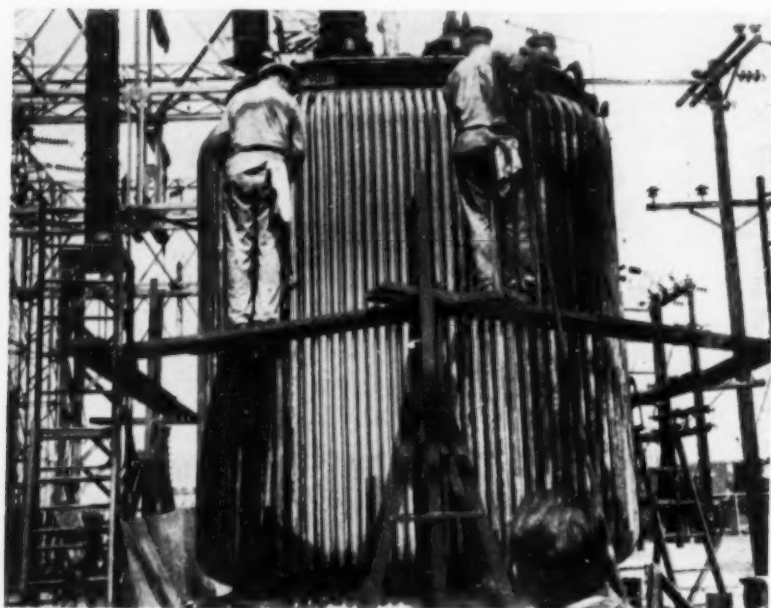
VULCAN *Automatic Soot* **BLOWERS**

SUBOX

guards all three!

with maximum protection
and minimum application

**STRUCTURES
EQUIPMENT
FENCES**



- Subox paints assure both good radiation and excellent protection for transformers and sub-station equipment. They are easily applied by brush, spray or flow-coating. Use them on your present equipment—specify them on your present equipment—specify them on your new.

- All varieties of Subox and Subalox can now be supplied with a faster-drying vehicle for distribution transformers and other shop work.

- Sub-station structures can often be painted with a single coat and a minimum of outages.

- Industrial-type fences can be amply protected with one coat applied by floor brooms.

For simplified low-cost upkeep, write for free pamphlet "Electric Light & Power Maintenance".

Subox Inc.

6 FAIRMOUNT PLANT

HACKENSACK, N. J.

news (continued)



Peyton L. Morgan, Jr.

U. S. Hoffman—Sou. Engr.

PEYTON L. MORGAN, JR., has been appointed Southern district engineer for the Air Appliance Division of the U. S. HOFFMAN MACHINERY CORPORATION, New York City. He will coordinate the activities and be responsible for application engineering in Virginia, West Virginia, Ohio, Kentucky, Indiana, Tennessee, Georgia, N. Carolina, S. Carolina, Alabama and Florida.

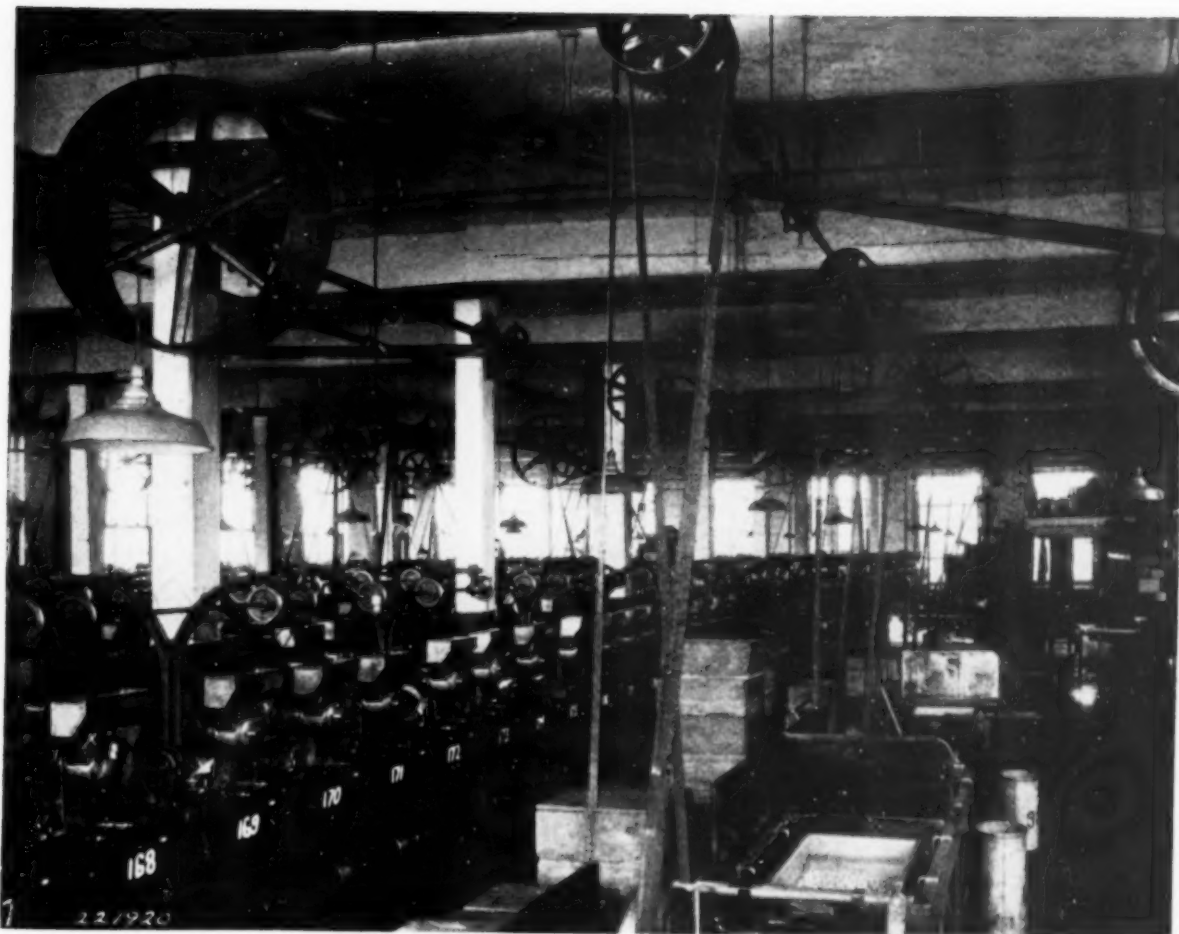
Morgan is a graduate of Virginia Polytechnic Institute and is a registered engineer. He joined the Hoffman Company in 1948 as an associate of the Lynchburg, Va., representative and has held that position until his new appointment.

Hoffman's Air Appliance Division manufactures centrifugal compressors, pneumatic conveying equipment and industrial vacuum cleaning equipment.

Rodney Hunt—Atlanta

W. C. DAVIS & ASSOCIATES, ATLANTA, GEORGIA, has been appointed agent in the Southeast for RODNEY HUNT MACHINE CO.'s Process Equipment Division. Headed by Mr. WALTER C. DAVIS, the organization will have complete sales engineering and marketing responsibility for the company's stainless steel processing equipment.

Mr. Davis has had more than 15 years of experience in chemical and allied industries following his graduation from the University of Tennessee with a degree in chemical engineering. At various times he has been associated with du Pont, Allied Chemical & Dye, American Machine and Metals, and Sharples Corporation. At Sharples, Mr. Davis served as manager of the process engineering department.



A Cut Above The Average

THE *right* cutting oil for the job gives cutting tools longer life, reduces rejects; produces cleaner cuts and finer finishes. Throughout the South, producers of machine tools and precision instruments have learned from experience that they can depend on Standard Oil Cutting Oils to help them secure improved finish, closer tolerances; and to cushion against shock and protect tools from wear in cutting, drilling, reaming

and tapping. Because of their great cooling effect, they make high speeds possible. There is a Standard Oil lubrication engineer in your area. His accumulated experience on lubrication in your field will be helpful. His services cost you nothing—they may save you much.

Standard Oil Company
(KENTUCKY)



GOULDS

CENTRIFUGAL PUMPS

HORIZONTALLY SPLIT CASE • SINGLE STAGE • DOUBLE SUCTION

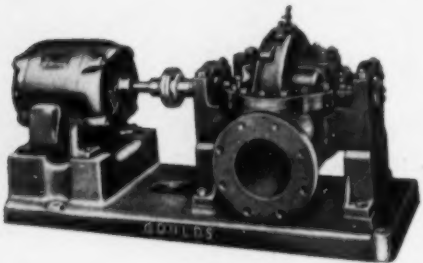


FIG. 3405

12 pages of facts about
a NEW LINE of 19 pumps

Minimum Size
Capacities 250-
6000 G.P.M.
Heads Up
To 140 Ft.
Maximum
Standardization
and Inter-
changeability
of Parts
High Quality
Design and
Materials
Many Other
Outstanding
Features

The quickest way you can really discover what the new Goulds Fig. 3405 centrifugal pump can do for you is to read the descriptive bulletin pictured above.

Here are some hints of what you'll find:

The quality of materials and extras of design that you have been able to get only by paying extra are standard on this new pump: stuffing box bushings, stainless steel impeller keys, Teflon water seal rings—to mention a few.

The Fig. 3405 carries interchangeability of parts far beyond anything we've been able to do be-

fore. Only three shaft and rotating parts assemblies (exclusive of impellers and wearing rings) provide for 19 pump sizes.

This means real spare parts inventory savings for any plant that uses many pumps. It also means easy-to-make field changes to meet new requirements.

We've come as close as modern design and materials allow to putting into this new pump what our industrial customers have told us they want. The 12-page illustrated bulletin tells you all about it. We'll be glad to send you a copy.

To get a copy of Bulletin 721.6, get in touch with the nearest Goulds representative or just fill in the coupon, pin it to your letterhead and mail it to us at your convenience.



GOULDS PUMPS, INC.

Dept. SP, Seneca Falls, N. Y.

Please send me 12-page information Bulletin No. 721.6 on the new Fig. 3405 centrifugal pump.

Name _____

Company _____

Street _____

City _____ Zone _____ State _____

news (continued)



TINY GIANT—The thimble-size power-type transistor being held in the left hand of Dr. Finn J. Larsen, research director at M-H, has the same output as the large vacuum tube shown—20 watts, or enough to operate motors, valves, relays and other equipment previously impossible to operate with transistors.

Powerful New Transistor

A THIMBLE-size transistor that is 100 times as powerful as present commercially available types has been developed in the research laboratories of MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.

Dr. Finn J. Larsen, research director, said the new power unit, which has an output of 20 watts, would do work not possible with the low-output types now being produced commercially, and thus should greatly expand the range of transistor uses.

A prototype aircraft electronic fuel gauge making use of the new transistor already has been built by the company, Dr. Larsen said, though the transistor is not yet in commercial production, being built on a pilot-line basis.

The new transistor's power output of 20 watts contrasts with that of 20 hundredths of a watt for present commercial types of the electronic midgets that are replacing vacuum tubes in many applications. This greater power, Dr. Larsen said, enables it to do things heretofore impossible with transistors, such as the operation of motors, valves, relays and other equipment.

"The inability of transistors to handle sizable amounts of current," Dr. Larsen said, "has been a major drawback and one that many researchers in the electronic industry have been trying to overcome. The



Meet the man you can call
with confidence to solve your
thermal insulation problems



To insulate outdoor tanks with complete weather protection, these skilled J-M applicators follow a specification developed by Johns-Manville. Here they are fastening J-M Asbestocite® Sheets over J-M Zerolite® Insulation. J-M 85% Magnesia Insulation is also widely used for this type of equipment

He is your J-M Insulation Contractor... the man with the world's most complete insulation engineering service

"Insulation is no better than the man who applies it." Today, with rising fuel and maintenance costs, it is especially important to place your insulation job in skilled hands. The scientific application of J-M quality insulations by J-M Insulation Contractors will assure you of the maximum return on your insulation investment for years to come. Moreover, you get undivided responsibility for *all* your insulation requirements.


1. You get dependable materials— Johns-Manville manufactures a complete line of insulations for every service temperature from minus 400F to plus 3000F. From them your J-M Insu-

lation Contractor can select the right insulation for the most dependable service on your job. To develop new and improved insulation materials Johns-Manville maintains the J-M Research Center—largest laboratory of its kind in the world.

2. You get dependable engineering —For 95 years Johns-Manville has been accumulating insulation engineering experience. J-M Insulation Engineers are called upon to solve insulation problems of every type and magnitude, in every industry. Since your J-M Insulation Contractor works closely with J-M Insulation Engineers, he brings to every job a high degree of

training, skill and experience.

3. You get dependable application —Johns-Manville has set up a nationwide organization of J-M Insulation Contractors to serve you. These Contractors maintain staffs of insulation engineers as well as skilled mechanics thoroughly trained in J-M's proved application methods. You can have absolute confidence in their ability to apply J-M insulations correctly for trouble-free performance.

For further information and the name of your J-M Insulation Contractor, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ont. 

Johns-Manville **FIRST IN INSULATION**

MATERIALS • ENGINEERING • APPLICATION

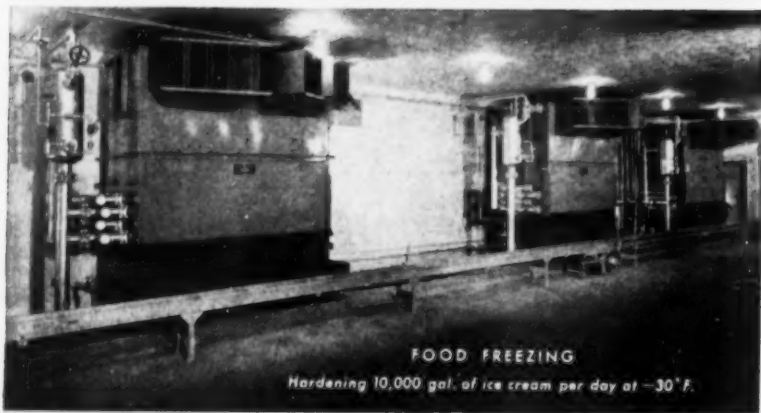
NIAGARA "No-Frost"

**SUCCESSFUL
IN BIG
INSTALLATIONS**



PRECOOLING

2 Niagara Spray Coolers pre-cool 3500 boxes of pears per 24 hours—total storage capacity 40,000 boxes.



FOOD FREEZING

Hardening 10,000 gal. of ice cream per day at -30°F .



FROZEN FOOD STORAGE

Room 80 ft. x 135 ft.—Temperature -5°F .

NIAGARA "No-Frost" gives you extra capacity and better operation. It improves quality, especially in foods, where it brings the product to correct temperature faster and holds it without fluctuation. It saves money for you in the cost of power and labor. With Niagara "No-Frost" there is never any "de-frosting" loss of time or temperature rise.

Write for Bulletin 103

NIAGARA BLOWER COMPANY

Dept. SP, 405 Lexington Ave.
New York 17, N. Y.

Sales Engineers in Principal Cities
of U. S. and Canada

news (continued)

big stumbling block has been the problem of heat."

The key to Honeywell's development of a power-type unit, he added, was the discovery of an effective means of removing heat from the germanium-alloy junction.

New Temco Executives

TEMCO AIRCRAFT CORPORATION, Dallas, Texas, has recently created four new management positions.

WILLIAM A. TWEEDIE, who has headed the Garland plant since 1951 as factory manager, is now plant manager. JOHN T. BUTLER, formerly chief tool engineer at the Dallas plant, is now assistant plant manager at Garland.

HERROL W. BELLOMY, formerly general superintendent at the Greenville plant, is now plant manager there. His assistant manager is W. N. HALL, formerly Dallas plant superintendent of sheet metal detail fabrication and sub-assembly.

Port of Houston Names Lamport and Bryant

The Port Commission has appointed WARREN D. LAMPORT of Seattle as general manager of the PORT OF HOUSTON and VAUGHN M. BRYANT, formerly of Austin and New Orleans, as director of international relations, a new position.

Both men are widely known in shipping and port circles, not only in the United States but throughout the world.

Thor Power Tool—Atlanta

ERNEST D. FISCHER, formerly service engineer in the THOR POWER TOOL COMPANY'S BIRMINGHAM, ALABAMA territory, has been appointed manager of the company's new factory branch office at 1363 Spring St., ATLANTA, GEORGIA. The office handles sales and service for Georgia, Florida, South Carolina, and part of North Carolina.

Nat'l Carloading, Sou. Div.

MITCHELL B. MOORE, of DALLAS, TEXAS, has been appointed a Vice-President and placed in charge of NATIONAL CARLOADING CORPORATION'S newly formed Southern Division, with headquarters in Atlanta, Ga. Hugh

E. Cooney will assist Mr. Moore in giving freight forwarder service to and from the South through National's network of 150 stations.

Chemstrand—Pensacola, Fla.

Another milestone in construction for THE CHEMSTRAND CORPORATION at PENSACOLA, FLORIDA, was marked when part of the nylon manufacturing area was put into operation for testing and further training of personnel. ROY G. HEMMINGHAUS is nylon plant manager. As facilities are completed, they will undergo thorough testing and evaluation before they are used for commercial production.

The plant comprises two basic areas, the chemical area where the intermediates will be produced and the textile area where the fiber is spun, plus 30 other structures that are necessary for a project of this scope.

Reichhold Expansion—Ala.

A ten million dollar over-all expansion program for REICHOLD CHEMICALS, INC., has been announced.

The program calls for the improvement and enlargement of production facilities in all twelve of the company's domestic plants with an eye toward producing basic chemicals and selling them to industry.

Inaugurating the program will be a three million dollar expansion of Reichhold's TUSCALOOSA, ALABAMA, plant for the production of five million pounds of pentaerythritol for the first time and thirty million pounds of formaldehyde, both components of RCI's synthetic resins.

Plans for expansion work on the company's other plants will be announced in the near future.

Coated Abrasive Grinding Demonstrated

CONTAINED in "Carborundum's Abrasive Workshop" is a total of eight stationary coated abrasive grinding machines and a variety of portable tools—some standard and some completely new—which are demonstrated in actual production grinding operations.

"It is our intent to bring to the attention of as many industrial prospects as possible, a first-hand view of the coated abrasive machinery available, as well as latest innovations in both stationary and portable coated abrasive grinding techniques," stated

NOT A WEAK LINK IN THE CONSTRUCTION OF "BUFFALO" INDUCED DRAFT FANS

So much depends on the continued operation of your draft fans that it pays to be sure that there are no weak links in the construction. Housings, wheels, blades, bearings and shafts—all must be up to the job, or the fan as a whole cannot function.

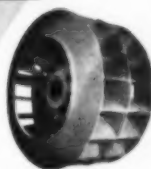
Every part of a "Buffalo" Induced Draft Fan is built up to stand known conditions of wear, heat and erosion. The shaft is turned from a solid piece of forged steel with extra large thrust collars. Bearings are heavy-duty, self-aligning and water-cooled. Housings are heavy-gauge steel, hot-riveted, with removable scroll liners where erosion is most severe. Blades are built up with welded-on wearing strips. In short, every "link" in the construction of these fans is designed for maximum long life in this punishing fan job.

It is all part of the "Q" Factor® which assures you of best results whenever you buy "Buffalo". Write now for Engineering Bulletin 3750.

BUFFALO FORGE COMPANY 530 BROADWAY BUFFALO, N. Y.

Publishers of "Fan Engineering" Handbook
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

rotor



housing



bearings



shaft



© The "Q" Factor—
The built-in quality which
provides trouble-free
satisfaction and long life.



H. P. Dales, sales manager of Carborundum's Coated Abrasives Division, in announcing the new mobile unit. "We hope particularly to inform the man in the plant, who is the actual user and prospective user of our products. The Abrasive Workshop is well equipped to perform this service."

The new vehicle is completely self-contained. It supplies its own power to operate the machine tools and the interior fluorescent lighting and heat or air conditioning. Two five-ton air conditioners provide audience comfort and operate a dust-disposal unit used in conjunction with the grinding machines. A small compressor is available to power the portable tools.

In addition to the abrasive machines, the vehicle has a complete sound system, incorporating a message repeater, a sound motion picture system, and a library of literature describing the abrasive tools and their applications.

More than 20 grinding demonstrations have been devised, representing a wide variety of typical grinding operations. Only a selected grouping will be presented at any one time, however, in keeping with the interests of the audience.

Two carborundum engineers ac-



EXPANDING SIDE-WALL is a novel feature—increasing the effective width of the vehicle to 15 ft when vehicle is stationary and demonstrations are underway. Carborundum's 19 ton, 35 ft long workshop is now on a nation wide tour.

company the Abrasive Workshop and conduct the demonstrations. Their experience with the company plus specialized training, qualifies them to interpret the adaptability of Carborun-

INSIDE THE TRAVELING WORKSHOP are eight stationary coated abrasive machines and a variety of portable grinding tools. This permits demonstrating the coated abrasive products in actual production grinding operations.

dum's coated abrasive products to grinding operations. They will be assisted in the field by company salesmen and distributor salesmen in the sales districts visited.



High grade gas, by-product, steam and household stoker coal from Wise County, Virginia, on the Interstate Railroad.



High grade gas, by-product, steam and domestic coal from Wise County, Va., on the Interstate Railroad.



High grade, high volatile steam and by-product coal from Wise County, Va., on the Interstate Railroad.



The Premium Kentucky High Splint unmatched for domestic use. Produced in Harlan County, Kentucky, on the L. & N. Railroad.

COKE

Roda and Stonega from Wise County, Va.



High grade gas, by-product, steam and domestic coal—Pittsburgh seam from Irwin Basin, Westmoreland County, Pennsylvania, on the Penna. Railroad.



High volatile domestic, steam and by-product coal from Boone and Logan Counties, W. Va., on the Chesapeake & Ohio Ry.



Genuine Pocahontas from McDowell County, W. Va., on the Norfolk & Western Railway.



High fusion coking coal for by-product, industrial stoker and pulverizer use from Wyoming Co., W. Va., on the Virginian Ry.

ANTHRACITE

Hazel Brook—Premium Lehigh
Raven Run—Premium Mahanoy
Cross Creek—First Grade Lehigh

Our engineering service, available upon application, and long and varied experience is your assurance of the Right Coal — Properly Applied.

General Coal Company

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PHILADELPHIA 9, PA.

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NEW YORK

CINCINNATI
NORFOLK

Chemstrand Corp.—Ala., Fla.

THE CHEMSTRAND CORPORATION, DECATUR, ALABAMA, has announced that newly named vice presidents are: ROY G. HEMMINGHAUS, F. WILLIAM KOSTER, WILLIAM G. LUTTGE and DR. FRANK J. SODAY. THOMAS H. CHOATE has been elected as secretary and JAMES H. CROW, JR., assistant secretary.

Chemstrand is a jointly owned associate company of American Viscose Corporation and Monsanto Chemical Company with corporation headquarters located at Decatur, Alabama.

Mr. Hemminghaus is plant manager of Chemstrand's nylon filament yarn manufacturing facilities now under construction near Pensacola, Florida. Prior to joining Chemstrand, in December, 1950, he had completed 20 years of service with Monsanto Chemical Company. As vice president Mr. Hemminghaus will continue to be in charge of the nylon plant operations.

Mr. Koster, who resigned as secretary, is Acrilan acrylic fiber plant manager at Decatur. He will continue to serve as vice president in charge of the Acrilan manufacturing plant operations. Previously he was associated with American Viscose Corporation for 22 years and before that served with E. I. duPont de Nemours & Company, Inc., for 12 years.

Mr. Luttge is general sales manager for Chemstrand and will continue in his present capacity as vice president in charge of sales with his office at the firm's New York sales headquarters. Before his appointment in October, 1951, he was associated with American Viscose Corporation for 27 years.

Dr. Soday is director of research and development for Chemstrand and will be vice president and director of these same activities at the firm's multi-unit research center at Decatur. Dr. Soday, who holds approximately 130 U. S. patents, previously was associated with Lion Oil Company, Devoe & Reynolds Co., Inc., Copolymer Corporation, United Gas Improvement Company and Monsanto Chemical Company.

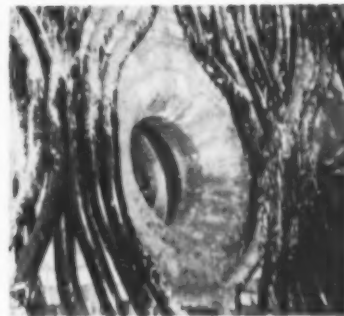
Graver Names Vener—Texas

MAINTENANCE ENGINEERING CORPORATION, HOUSTON, TEXAS, sales representative for GRAVER WATER CONDITIONING COMPANY, has added ALVIN S. VENER to its staff of engineers. Mr. Vener holds the degree of Bachelor of Science in Chemical Engineering from the University of Texas and has been a process engineer for several Texas concerns.

BIG KENTUCKY STEAM BOILER USES "TEAM-WORK" REFRACTORY WALLS, PORTS, BAFFLES



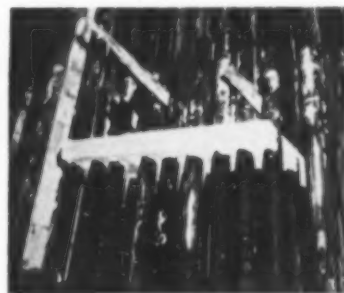
MASONS dip joints to speed laying up side walls of the boiler with **IRONTON STEEL Fire Brick (High Duty)**.



BURNER PORTS of the boiler are special shape brick made of Ironton's uniformly high P.C.E. Kentucky flint clay.

Any boiler installation is bound to give better service when all the refractories are engineered to work together. That's why experts prefer Ironton "Reliable Refractories" made from Kentucky high P.C.E. clays. Whether it's standard series fire clay brick, special shapes, or the new castable and insulating refractory concretes, Ironton ASSURES coordinated performance under specified service conditions.

TECHNICAL BULLETINS on all the materials used in the job pictured here will be sent on request. Get in touch with the Ironton representative in the nearest southern city, or write to the Bulletin Secretary at Ironton.



MONOLITHIC BAFFLE of castable refractory concrete saves brick mason labor, cuts costs as much as 100%.




Southern representatives

P. Richardson
1047 Northwest 22nd Street
MIAMI 37, FLORIDA
Phone—82-5782
Robbins and Bohr
1012 Hamilton National Bank Bldg.
CHATTANOOGA 2, TENNESSEE
Phone—7-6697

C. M. Solberg
KENTWOOD, LOUISIANA
Phone—2191
The Ironton Fire Brick Company
1112 Florida Title Building
JACKSONVILLE, FLORIDA
P. O. Box 4728
Phone—3-5586

Earl A. Swenson
9303 Sutton Place
SILVER SPRING, MARYLAND
Phone—JUNiper 7-5468
Henry M. Witmyer & Co.
1313 Proctor Street
BALTIMORE, MARYLAND
Phone—MULberry 7184

ASK FOR TECHNICAL BULLETINS ON NEW CASTABLES, SPECIAL SHAPES, "STEEL" BRICK



**"THIS LUBRICANT
EXTENDED
BEARING LIFE
50%"**

—says REPUBLIC AVIATION CORP.
Makers of the famous F-84E THUNDERJET

"Under actual tests, LUBRIPLATE extended bearing life fifty per cent or better as compared to other lubricants. It was also found that, during test, LUBRIPLATE increased efficiency of machines twenty per cent by reducing friction loss. Republic has been using LUBRIPLATE successfully for the past eight years."

**REGARDLESS OF THE SIZE AND
TYPE OF YOUR MACHINERY,
LUBRIPLATE GREASE AND
FLUID TYPE LUBRICANTS WILL
IMPROVE ITS OPERATION AND
REDUCE MAINTENANCE COSTS.**

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.



For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



New Station for KG&E

A new generating station with a total load capacity of 117,000 kilowatts has been put into operation by the KANSAS GAS AND ELECTRIC COMPANY, WICHITA, KANS.

Two generating units—one 47,000 kw, and another 70,000 kw—have been erected at Murray Gill by the Ebasco Services, Inc. The new station is part of KG&E's expansion program to meet increased load demands of the Wichita and southwest Kansas region.

A compactly designed control panel facilitates regulation of operation of the new station. Incorporating miniaturized recording instruments, especially developed by Minneapolis-Honeywell's Industrial Division, the panel monitors a variety of critical operating conditions. These include turbine steam pressures and temperatures, boiler excess air and condenser vacuum.

Buffalo Forge Elects Cheney

CHARLES C. CHEYNEY, Sales Manager and a director of BUFFALO FORGE COMPANY, has been elected Vice President of Sales and Engineering.

Mr. Cheyney, a graduate of Cornell Engineering School, was with the

company several years before his 1928 appointment as Assistant Sales Manager. He became Sales Manager in 1945 and later was elected a director of the company.

American Bitumuls & Asphalt Establishes Baltimore Office

AMERICAN BITUMULS & ASPHALT Co., producers of asphaltic products for industrial roofing, flooring, waterproofing, and maintenance, is establishing an office at 10 East Fayette Street, BALTIMORE, MD.

L. P. STREET, Vice-President in Charge of Eastern Marketing for the company, will head the new office. M. A. Ernst will serve as Staff Assistant.

Kulman Handles Master Rule Line—Southeast

MASTER RULE MANUFACTURING COMPANY, Middletown, N. Y., announces that KULMAN BROKERAGE COMPANY, HERMAN M. KULMAN, Pres., ATLANTA, GEORGIA, is now direct factory representative for its line of fine steel tape and folding rules throughout North and South Carolina, Georgia, Alabama, Tennessee, Mississippi and Florida.

"ELECTRICITY AND ELECTRICAL POWER"

Basic information on the fundamentals of electricity
for the first time available in ONE Volume!

A limited edition of this important handbook has just been printed and is available to subscribers to SOUTHERN POWER AND INDUSTRY only. Order your copy NOW with a new or renewal subscription to this magazine.

All you have to do to own this valuable booklet is to check the coupon below now, and send it back to us. For three dollars, you get a three-year subscription to SOUTHERN POWER AND INDUSTRY plus "Electricity and Electrical Power"!

Yes!

I accept your invitation. You may enter my 3-year subscription to SOUTHERN POWER AND INDUSTRY and send me my personal copy of Electricity and Electrical Power at the special combination rate of \$3.00.

☐ Enclosed find \$3.00

☐ Send bill for \$3.00

NAME

ADDRESS

CITY STATE

CLASSIFICATION DATA

If an individual give name of firm connected with and title of position.

Firm..... Position.....

Products manufactured
or nature of business.....

Enclose coupon with remittance. If you want to be billed, send coupon alone.

news (continued)

Stromberg-Carlson—Texas

STROMBERG-CARLSON COMPANY, Rochester, N. Y., announces that JACK W. WILLIS has joined its DALLAS, TEXAS, office as a sales engineer.

A native Texan, Mr. Willis attended Southern Methodist University. He will engineer sound systems for industrial and other commercial establishments.

G.E. Names Molette—Va.

W. P. MOLETTE, JR., has been named Manager-Electric Utility Sales for GENERAL ELECTRIC's Apparatus Sales Office in RICHMOND, VIRGINIA.

Born in Beaumont, Texas, Molette was graduated from Alabama Polytechnic Institute. He joined G. E. in 1928. Since 1937 he has handled Central Station Sales both in Charlottesville and in Richmond. He is a member of the Virginia Section of AIEE.

A-C Assigns Havron—Miami

WILLIAM T. HAVRON has been assigned as a sales representative to the MIAMI branch office of ALLIS-CHALMERS general machinery division.

A 1951 industrial management graduate of Alabama Polytechnic Institute, Havron recently completed Allis-Chalmers training course for graduate engineers. He is a member of the Society for the Advancement of Management.

Leschen Wire Rope—S.W.

A new sales district covering TEXAS, LOUISIANA and OKLAHOMA has been established by LESCHEN WIRE ROPE DIVISION, H. K. PORTER COMPANY, INC., St. Louis.

The new district has headquarters in Houston, Texas, and will be managed by F. E. SUDER. Mr. Suder has been with the Porter organization in various capacities since 1951. He has held sales and management positions with National Supply Company and International Derrick and Equipment Company before becoming associated with Porter.

Foxboro—Amarillo, Texas

The opening of a branch office at 1117 La Paloma St., AMARILLO, TEXAS, is announced by THE FOXBORO COMPANY, Foxboro, Mass., manufacturer of industrial instruments for the measurement and control of process variables.

Assigned to the office as Industrial Engineer, is MR. D. T. McELIGOTT, a

graduate of Texas Technological College with a degree in Electrical Engineering. Mr. McEligott, formerly with the Foxboro office in Dallas, will serve instrument users in parts of Oklahoma and New Mexico, in addition to the Amarillo area.

C. Lee Cook—Louisville

The election of PHILLIP W. METTLING to Vice-President and General Sales Manager of C. LEE COOK MFG. CO., LOUISVILLE, KY., manufacturers of metallic compressor piston rod

packings and graphitic iron piston rings, was announced recently. Mr. Mettling was formerly associated with the Cooper-Bessemer Company. His headquarters will be in Louisville.

Emerson Elects Persons—Mo.

WALLACE R. PERSONS became president and a director of the EMERSON ELECTRIC MANUFACTURING COMPANY of St. LOUIS, effective Jan. 1, 1954.

Mr. Persons has been vice-president and general sales manager of the Lincoln Electric Company of Cleveland.

Industrial

Underhung CRANES

feature Forged Steel Wheels with Hardened Treads



Consistent with the company policy of constant improvement in their products, the Industrial Crane & Hoist Corporation provides FORGED STEEL WHEELS with HARDENED TREADS on Industrial Underhung Model Cranes. This improvement combined with other exclusive "Industrial" features will assure longer service life and lower maintenance costs.

Industrial Underhung Cranes are equipped with patented "Industrial" removable head axles, heavy duty ball and roller bearings throughout, roller chain flexible couplings, enclosed gear drive operating in sealed oil bath, and jig-assembled, jig bored all-welded end trucks.

Industrial all-welded cranes are available in single and double girder types with capacities up to 20 Tons and are the outstanding crane buys in industry today.

WRITE FOR CATALOGS



INDUSTRIAL CRANE & HOIST CORPORATION

(Formerly Industrial Equipment Co.)
373 NORTH ADA STREET CHICAGO 7, ILLINOIS
Overhead Cranes • Jib Cranes • Monorail Systems • Crane Runways
Representatives in Principal Cities

Southern Representatives are Located in

Atlanta	Mobile	Dallas
Jacksonville	Nashville	San Antonio
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Pumping Station—Memphis, Tennessee

TO MEET the needs of increased water consumption in Memphis, Tennessee, the city recently constructed the Thomas H. Allen Pumping Station, which supplies an additional 30 million gallons of water a day. With a future increase to 60 gallons per day, the station's total capacity will amount to an almost 50% increase in the city's water supply.

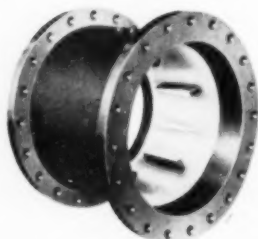
At the present time, two De Laval centrifugal pumps move the 30 million gallons daily to the users. The instal-

lation of two more pumps of the same size now on order with De Laval will bring the station's total capacity up to 60 million gallons daily.

Complete reliance is placed on the pumps to supply adequate water to the distribution system. Operating in a distribution system which has no elevated storage, the pumps will be varied in speed to suit the demand.

Each De Laval pump is rated 15 million gallons per day when operating against a total head of 180 ft at 1200 rpm. The General Electric Com-

Flow Tubes—For Accuracy in Metering



The Flow Tube is an impact-type head meter designed for accurate measurement and regulation of fluid flow. It consists, essentially, of a short spool piece, the inner periphery of which is equipped with two groups of pressure nozzles, one group pointing upstream and the other downstream. The nozzle groups are inter-connected by common pressure rings from which connections are made to the high and low pressure sides respectively, of a con-

ventional indicating, recording or integrating meter. Flow Tubes differ from other variable head meters in that the taps are located at points of equal cross-sectional area. Therefore, the differential developed is a function of the velocity head and independent of the static head.

Flow Tubes are compact, comparatively light weight, relatively low in cost, and are easy to install since they require straight runs entering and following only when installed near throttling valves or regulators. And, Flow Tubes are available in types and D/d ratios to provide differentials that can be accurately measured with the least head loss.

Flow Tubes are furnished with head capacity curves based on laboratory tests. These data furnished with each Flow Tube makes our guarantee of exceptional metering accuracy possible.

For further information, write us, and for specific recommendations, send us necessary flow data.

FOSTER ENGINEERING COMPANY

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pany supplied the 600 hp, 2300 volt, wound-rotor motors. Power for the pumps is supplied from two lineups of General Electric 2400 volt "double-bus-double-breaker" switch-gear.

In addition to the centrifugal pumps for the new Thomas H. Allen Pumping Station, De Laval has supplied the city of Memphis with pumps for its water system since 1929. The total capacity of the pumps installed since then will be over 194.5 mgd when the latest units are put on the line.

Chemstrand Officers—Ala.

OSBORNE BEZANSON has assumed his new position as chairman of the Board of Directors of THE CHEMSTRAND CORPORATION, DECATUR, ALABAMA, and HENRY H. BITLER is now president.

Chemstrand is a jointly owned associate company of American Viscose Corporation and Monsanto Chemical Company. Last month marked 48 years of continuous service for Mr. Bezanon with Monsanto and its affiliated companies.

Mr. Bitler was associated with American Viscose Corporation for 33 years and has devoted most of his career in the field of man-made textile fibers.

In the past 15 years, Mr. Bezanon has been responsible for building and operating a \$20,000,000 government TNT plant at Karnack, Texas; building and operating the vast Texas City installations of Monsanto, and managing the six-plant Organic Division.

He has served as vice-president and director of Monsanto and as a member of the company's executive committee just prior to joining the Chemstrand organization.

Texas Gas Transmission, Ky

TEXAS GAS TRANSMISSION CORPORATION of OWENSBORO, KENTUCKY, plans to construct new pipeline and compressor facilities between MEMPHIS, TENNESSEE, and SLAUGHTERS, KENTUCKY, to sell an average of 50 million cu ft a day of "off-peak" gas to AMERICAN LOUISIANA PIPE LINE COMPANY, a subsidiary of American Natural Gas Company, thereby materially improving load factor of the system.

Worthington—Kansas City

JOHN R. HAMILL has been appointed Manager of the KANSAS CITY District Office of WORTHINGTON CORPORATION to succeed Paul J. Foley.

Mr. Hamill joined Worthington in 1937 after graduating from Northwestern University. In 1944 he was

appointed Gulf Coast Manager of the company's Marine Division. From 1950 until the present, he has served as Manager of Worthington's Wilmington Branch Office.

Nelson Stud Welding—Fla.

Appointment of the GENERAL ENGINEERING AND MACHINERY COMPANY of TAMPA, FLORIDA, as a distributor of its products has been announced by NELSON STUD WELDING DIVISION OF GREGORY INDUSTRIES, INC.

Stud welding guns, as well as Nelswelder welding machines and portable battery power sources will be available for purchase or rental through the Tampa firm which is headed by W. A. KRUSEN.

Lockheed Awards Contract to Georgia Factories for Blind

Sightless workers at the new GRIFFIN, GEORGIA plant of the GEORGIA FACTORIES FOR THE BLIND have started delivery of small aircraft parts being



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news (continued)

processed under contract awarded the plant by the Georgia Division, LOCKHEED AIRCRAFT CORPORATION, at Marietta, Ga.

The unique project will save for re-use 60 per cent or more of thousands of different kinds of tiny parts such as rivets, nuts, bolts, fittings, and screws. HUGH M. TERRELL is manager of the Griffin plant.

Glidden—Atlanta Plant

THE GLIDDEN COMPANY, Cleveland, Ohio, has recently completed modernization and expansion of its ATLANTA, GEORGIA plant to more than double its capacity for the production of paint and varnish.

The plant services 11 branches and warehouses in ALABAMA, TENNESSEE, FLORIDA, NORTH CAROLINA, and GEORGIA.

JAMES L. BEAUCHAMP is regional director, and WALTER S. HERNER is plant superintendent.

Insul-Mastic—Tenn., Ky.

THE M. H. ELLIS COMPANY of MEMPHIS, TENNESSEE, has signed a contract with the INSUL-MASTIC CORPORATION of AMERICA to sell and apply Insul-Mastic coatings in the Memphis area. These coatings are used for corrosion preventive applications to industrial equipment, and for the waterproofing of buildings.

ROBERT LEAR & SON is now representing Insul-Mastic in the LOUISVILLE, KENTUCKY, area.

American Bosch Plant—Miss.

Construction is under way on the new branch plant of AMERICAN BOSCH CORPORATION in COLUMBUS, MISS. The Brice Building Company of Birmingham, Ala., was awarded general contract.

The new factory of approximately 100,000 sq ft is scheduled for completion by April 1, 1954 and production will start immediately thereafter. Initially the plant will manufacture high volume automotive products such as voltage regulators, electric windshield wipers, and small motors.

W. C. ROBINSON, vice president of the company, is in charge of the Columbus operation.

American Bosch will continue to manufacture Diesel fuel injection equipment, aircraft components, and other electrical products in its main plant at Springfield, Mass.

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Avisco Promotions—W. Va.

Promotion of DR. LAWRENCE A. WILSON, JR., to development supervisor and of EARNEST D. SMITH to assistant foreman in the Staple Development Plant of AMERICAN VISCOSE CORPORATION at NITRO, W. VA., was announced recently by WILLIAM P. DOOLEY, superintendent.

In his new position Dr. Wilson will supervise technical personnel engaged in bench scale and small scale trials leading to semi-commercial operation.

Books for the Plant Engineer

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BY WILLIAM VON FISCHER AND
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This new book describes the fundamental theory and practice of paint as an engineering material. It specifically emphasizes the problems of formulation, specification, and application of organic coatings. Several chapters present the theories of physics and chemistry as applied to coatings technology. Many examples are considered to illustrate the manner of approach to everyday problems.

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PUBLISHED BY W. H. & L. D. BETZ
Gillingham & Worth Sts., Philadelphia 24, Pa.

250 pages
Price, \$3.00

This 4th edition of the Betz Handbook of Industrial Water Conditioning offers a practical up-to-date text for reference or study. Although it is basically a technical publication, one does not need specialized knowledge of water chemistry and engineering to understand the basic problems involved and the latest developments in water technology which the book presents.

Introductory chapters deal with basic water treatment processes such as aeration, coagulation, and softening. The following chapters are concerned with specific water problems, particularly those encountered in boiler water and cooling water conditioning. Applications and limitations are covered in detail.

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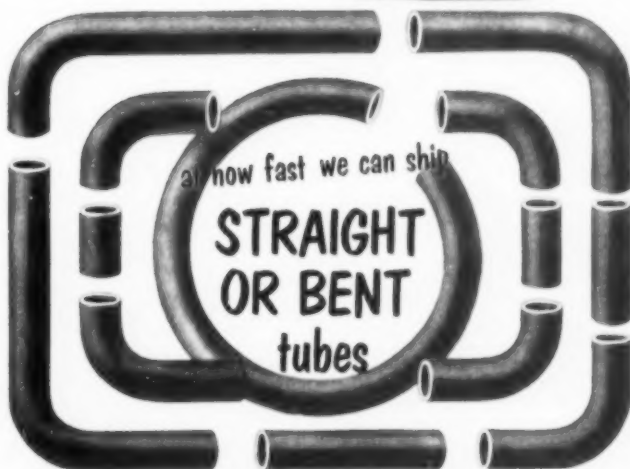
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N-1 TRANSITE DUCTS—Brochure, 12 pages—Covers installation and maintenance of Transite Conduit for exposed work and installation underground without concrete encasement; and Transite Korduct for installation in concrete. Illustrated with applicational photographs.—JOHNS-MANVILLE, 22 East 46th St., New York 16, N. Y.

N-2 REFRACTORY MATERIALS—Bulletin 104, 4 pages—Presents ten new refractory insulating concretes that can be mixed and cast in place for twenty typical heat-saving applications. Illustrates and describes Ironton Castables and Ironton Insulates, hydraulic setting mixes of aluminum silicate base, for service temperatures up to 3000 F.—THE Ironton Fire Brick Company, Ironton, Ohio.

N-3 POWER PLANT CLEANING—Booklet, 42 pages—Tells "How to Make Power Plant Cleaning Easier" in steam central stations, diesel and electric power plants, and descaling. Gives methods and solution concentrations and temperatures used in various applications. Illustrated with drawings and photographs.—OAKITE PRODUCTS, INC., 123A Rector St., New York 6, N. Y.

N-4 RUST PREVENTION—General Catalog No. 253, 26 pages—Features 94 color chips of Rust-Oleum products and includes complete instructions for surface preparation and application for different industrial requirements.—RUST-OLEUM CORPORATION, 2799 Oakton St., Evanston, Ill.

N-5 AIR AND HYDRAULIC CYLINDERS—Bulletin No. 800—Describes standard line of heavy duty air and hydraulic cylinders, with pertinent engineering data. Includes large, special custom built heavy duty cylinders.—LINDBERG ENGINEERING COMPANY, Air & Hydraulic Div., 225 N. Laflin St., Chicago 7, Ill.

N-6 OIL & GAS BURNER EQUIPMENT—Bulletin OB-53, 28 pages—Covers industrial oil and gas burner equipment: burners, registers, pumping and heating systems. Illustrated with equipment and plant installation photographs. Tables give engineering information.—THE ENGINEER COMPANY, 75 West St., New York 6, N. Y.

N-7 DEHYDRATION UNITS—Bulletin No. 16.0.081, 8 pages—Illustrates and describes Pritchard Hydryers—packaged dehydration units for efficient drying of air or other gases in all industrial, processing and laboratory installations. Tables give dimensions, load factors, and related data.—J. F. PRITCHARD & CO., 210 West 10th St., Kansas City 5, Mo.

N-8 COOLING TOWER DRIVES—Catalog No. CT-53—Information on use of gear reduction drives in cooling tower applications includes worm gear unit; spiral-bevel unit; and helical-spiral-bevel unit. Gives construction and operation details, with illustrations and selection data.—PHILADELPHIA GEAR WORKS, Erie Ave. & G St., Philadelphia 34, Pa.

N-9 GROUND RESISTANCE MEASUREMENT—Bulletin I-1, 8 pages—Technical data on measuring resistance of man-made grounds, theory application and methods of soil resistivity measurement; description and operating characteristics of eight basic ground resistance measuring instruments.—ASSOCIATED RESEARCH INCORPORATED, 3758 W. Belmont Ave., Chicago 18, Ill.

N-10 CONVEYING EQUIPMENT—Catalog GC-53, 16 pages—Contains photographs, specifications, and application suggestions on complete line of portable and permanent type belt units, gravity wheel and roller conveyors in steel and aluminum, and industrial casters and hand trucks for handling jobs.—THE RAPIDS-STANDARD CO., INC., Grand Rapids 2, Mich.

N-11 PORTABLE HOIST—Bulletin CH, 4 pages—Illustrates and describes the "Challenger" light-weight spur gear hoist of formed steel construction that features easy portability and resistance to shock load breakage. Includes drawings and specifications for models up to two tons.—COFFING HOIST COMPANY, Danville, Ill.

N-12 PRECIPITATOR—Bulletin No. 2294B, 20 pages—Covers applications, operation, design, flow diagrams, and specification of the Permutit Precipitator for removing impurities from a liquid by precipitation, adsorption, settling and filtration in industrial plants.—THE PERMUTIT COMPANY, 330 W. 42nd St., New York 36, N. Y.

N-13 PLANT MODERNIZATION—Brochure, 16 pages—"Basic Planning—Plant Modernization and Expansion" has been prepared to guide company management and engineers in analyzing existing plant facilities and arriving at the basic cost of a proposed modernization or expansion program.—WALTER KIDDE CONSTRUCTORS, INC., 140 Cedar St., New York 6, N. Y.

N-14 CASTERS AND WHEELS—Bulletin No. C-1, 8 pages—Describes the "Lockweld" caster without a king-pin, with single and double ball race swivel casters

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N-15 PURIFIERS—Condensed Bulletin No. 491, 4 pages—Contains selection tables for purifiers, scrubbers, mist extractors, and separators. Includes photographs, drawings and engineering data.—THE V. D. ANDERSON COMPANY, 1935 West 95th St., Cleveland 2, Ohio.

N-16 FIRE PROTECTION—Bulletin, 6 pages—Describes line of industrial fire protection hose including chemical and booster, single and double jacket cotton rubber lined, special flat folding type, and others. Illustrated.—QUAKER RUBBER CORPORATION, Division of H. K. Porter Company, Inc., Tacony & Conly Sts., Philadelphia 24, Pa.

N-17 STEEL STRAPPING—Bulletin, 4 pages—Advantages of fastening insulation with steel strapping are explained, with type of strapping most suitable for each job. Size, weight and type of steel strapping are shown in table form. Illustrated.—ACME STEEL COMPANY, 2849 Archer Ave., Chicago 8, Ill.

N-18 UNDERGROUND CONDUITS—Form 5219, 4 pages—Describes prefabricated Utilidor Conduits for protection of underground utility services. Illustrated with applicational photographs, and gives suggested specifications for conduit systems.—THE RIC-WIL COMPANY, 1952 Union Commerce Bldg., Cleveland 14, Ohio.

N-19 STEEL PLATE EQUIPMENT—Folder, 6 pages—Illustrates spiral weldments for industrial gas furnaces; discharge header; sections of duct work for a utility power plant; pressure vessel; double spiral agitator, and gives information about operating units for refineries; chemical plants; food, paper, textile, metal, and other industries.—CONTINENTAL BOILER AND SHEET IRON WORKS, 5691 West Park, St. Louis 19, Mo.

N-20 CONDENSERS & HEAT EXCHANGERS—Handbook, 156 pages—Prepared for engineers concerned with selection of tubes, design, operation and maintenance of all types of condenser and heat exchanger equipment. "Condenser and Heat Exchanger Tube Handbook" deals with properties of copper-base condenser tube alloys and their applications in the chemical, petrochemical, power, marine fields and processing industries. Various types of corrosion which affect condenser tubes from the water side are given in detail and illustrated with numerous micrographs and charts.—BRIDGEPORT BRASS COMPANY, Bridgeport 2, Conn.

N-21 CONTROL CENTERS—Booklet N-5621, 31 pages—Discusses characteristics of control centers that make for flexibility of application, ease of servicing, and safety of operating personnel; stresses desirability of centralizing all controls of an entire system in one group of enclosures. Describes three types of control centers. Illustrated.—WESTINGHOUSE ELECTRIC CORPORATION, Box 2099, Pittsburgh 30, Pa.

N-22 BELT CONVEYORS—Catalog 852, 99 pages—Standardized units are indexed and classified so that by referring to the proper tables it is easy to determine the correct conveyor to suit a given need, and then order the complete conveyor by its number. Includes list of anti-friction idlers in cast iron or steel, and lists related equipment.—THE JEFFREY MANUFACTURING COMPANY, Columbus 16, Ohio.



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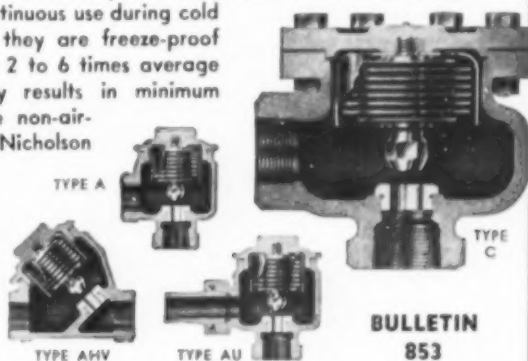


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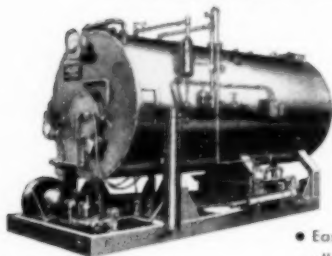
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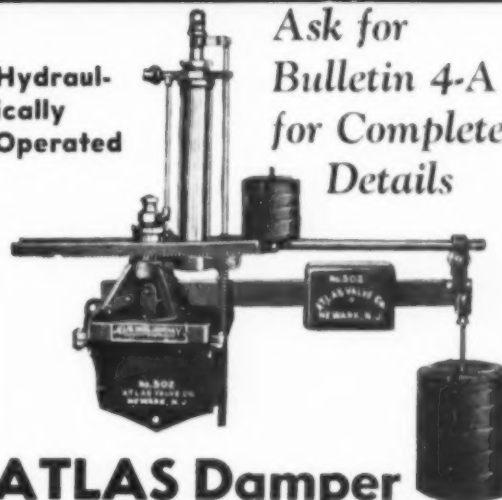
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- 9—ATLAS damper regulators quickly pay for themselves. Installed on almost any boiler they are an important economy factor.

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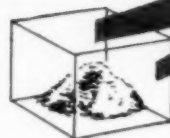
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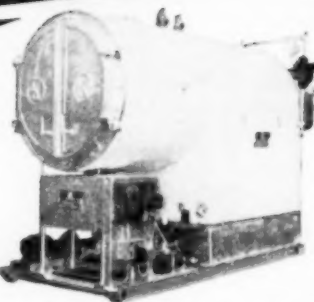


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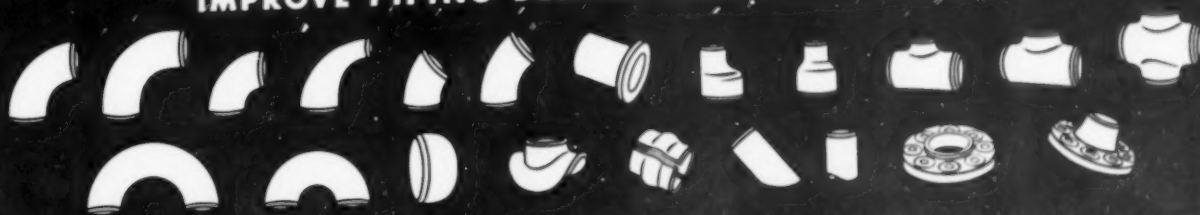
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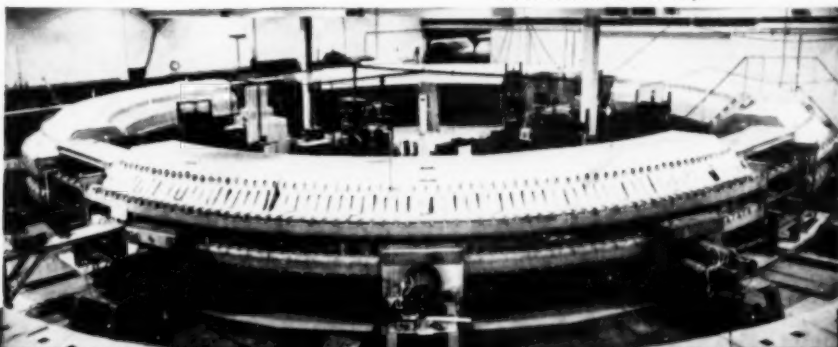
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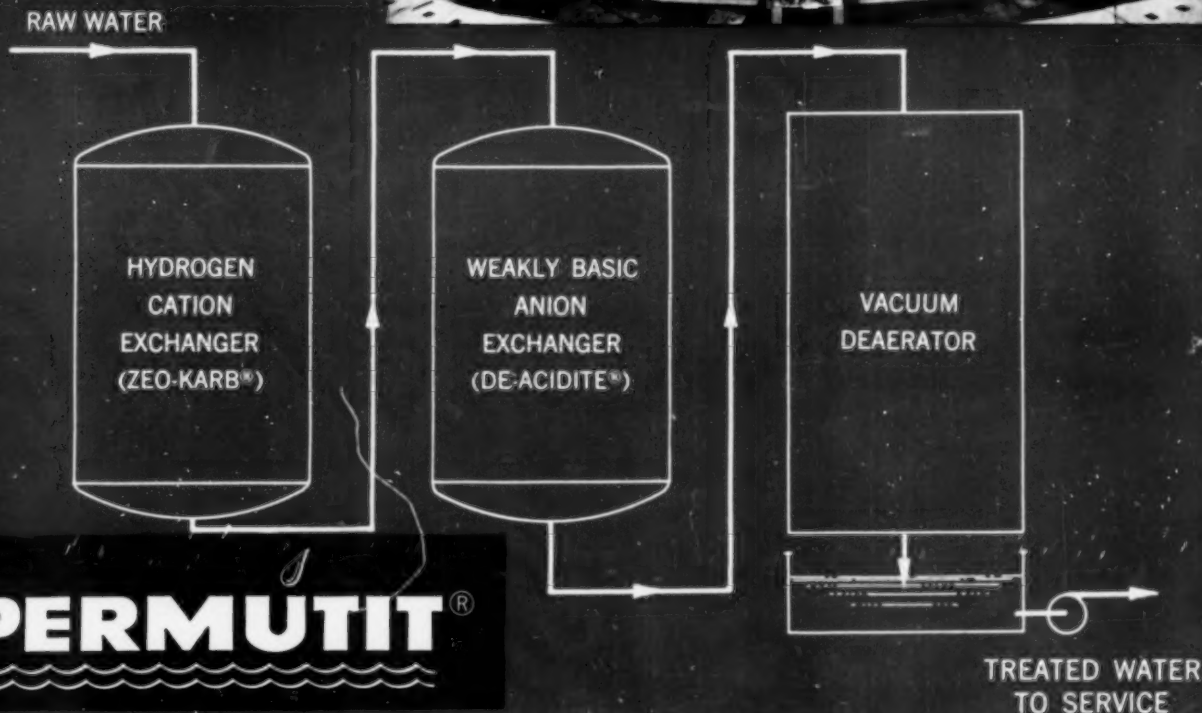
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